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Use of a self-monitoring treatment package to support teachers in developing and implementing self-monitoring interventions for children with developmental disabilities

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Use of a self-monitoring treatment package to support teachers in developing and implementing self-monitoring interventions for children with developmental disabilities

by

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Dedication

To my Mami and TT

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Use of a self-monitoring treatment package to support teachers in developing and implementing self-monitoring interventions for children with developmental disabilities

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Several empirical studies have suggested that self-monitoring is an effective strategy to increase appropriate behavior in children and adults with developmental disabilities. Results of a comprehensive review of self-monitoring research with people who have developmental disabilities revealed that 71% of the participants were trained by researchers. However, researchers are not typical intervention agents. To ensure that people who are typically in the participant's environment (e.g., teachers, parents, caregivers) can effectively teach people with developmental disabilities to self-monitor and that this in turn will change the participant's behavior, it is important that research examine the effectiveness of self-monitoring when the training is provided by typical intervention agents. Thus, the purpose of this dissertation study was to investigate the effects of a self-monitoring intervention package on both teacher and student behavior in

the classroom. The self-monitoring intervention package consisted of training teachers to use self-monitoring, providing feedback on the self-monitoring intervention developed by the teacher, providing feedback to teachers while training the student to self-monitor, and providing feedback to teachers while they implemented the self-monitoring intervention in the classroom. During intervention, the researchers provided feedback to teachers to ensure that teachers were correctly instructing the students to self-monitor. Teachers then implemented the self-monitoring intervention without researcher feedback (maintenance). Teachers required very little to no feedback after the self-monitoring training, feedback on the self-monitoring intervention they developed, and student self-monitoring training. The researcher provided immediate feedback during the first session when the self-monitoring intervention was implemented in the classroom to ensure the teachers implemented the self-monitoring intervention with fidelity. Rate of inappropriate sitting decreased for all students after the self-monitoring intervention was introduced, and the percentage of non-overlapping data metric values indicated that the self-monitoring interventions were highly effective for three participants and effective for one participant. Some teachers and some students generalized the use of self-monitoring interventions to other activities, students, and target behaviors. Social validity measures indicate that self-monitoring interventions for young children with developmental disabilities are socially important.

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CHAPTER 1

INTRODUCTION

Self-management skills have been taught to students with disabilities to support the development of appropriate social, academic, and vocational behavior. Self-management consists of multiple components that can be taught alone or used in combination with other procedures as part of a comprehensive intervention package. These components include the following: Self-monitoring, self-assessment, self-evaluation, self-instruction, self-observation, self-recording, and self-reinforcement (Lee, Simpson, & Shogren, 2007; Wehmeyer, 1996). Self-management aims to provide students with skills that allow them to control their own behavior, and there is an abundance of research suggesting that self-management interventions can increase student performance (McDougall, 1998).

McDougall (1998) reviewed the literature on the use of self-management in general education settings by students with disabilities. McDougall found that students' social and academic performance in general education classrooms was moderately to strongly improved through the use of self-management strategies. Moreover, a review by Hughes, Korinek, and Gorman (1991) found that self-management had positive effects (i.e., increasing independence, motivation, and academic and study skills) when used by students with an intellectual disability who attended public schools. Lee et al. (2007) performed a meta-analysis on the use of self-management with students who had autism. For students with autism, self-management was an effective strategy to increase appropriate behavior, such as appropriate playing; daily living and independent skills;

interactions and conversations with others; following schedules; and maintaining appropriate eye gaze, nonverbal mannerisms, and sharing.

In past reviews of self-management, self-monitoring has been the most widely used self-management strategy (McDougall, 1998). Self-monitoring involves learning a process of assessing one's own behavior. This is often considered to be the first step in the process of self-management (Misra, 1992). Self-monitoring is a cognitive-behavioral strategy that is said to impact overt behavior by changing private verbal behavior (Ganz & Sigafoos, 2005; Rankin & Reid, 1995). Self-monitoring consists of self-assessment and self-recording (McDougall). People are taught to self-monitor by learning to discriminate between occurrences and non-occurrences of specific target behavior and recording accordingly (Nelson & Hayes, 1981; Newman, Reinecke, & Meinberg, 2000; O'Reilly et al., 2002). Most self-monitoring interventions include reinforcement as a component of the intervention, which is used to promote both the acquisition of the skills associated with self-monitoring and the target behavior that is being self-monitored (Cooper, Heron, & Heward, 2006). The method of reinforcement delivery in self-monitoring interventions can take various forms, including reinforcement delivered by another person, such as a teacher or caregiver, or self-reinforcement, in which the person delivers his/her own reinforcement.

Self-monitoring is a potentially useful technique for a variety of reasons. First, self-monitoring can be relatively easy to use because once the student learns to self-monitor, little or no adult direction is required (Ganz & Sigafoos, 2005). Second, self-monitoring has been shown to promote generalization of target behavior across settings

(McDougall, 1998). Third, self-monitoring can be used to enhance quality of life by promoting self-determination (Lee et al., 2007).

Self-monitoring has been shown to be an effective intervention for people with various levels of disability. For example, self-monitoring has been used to increase academic performance in students with emotional and behavioral disorders across a variety of academic areas including writing, social studies, spelling, reading, and math (Mooney, Ryan, & Uhing, 2005). Mooney et al. conducted a review of self-management strategies that have been used to promote academic behaviors in children and adolescents with emotional and behavioral disorders. The self-management strategies reviewed were self-evaluation, self-instruction, self-monitoring, strategy instruction, goal setting, and interventions with multiple elements. Self-monitoring was the intervention that was used most frequently and had an average effect size of 1.9, which suggest a large and positive intervention effect (Mooney et al.).

Self-monitoring has also been studied with people with learning disabilities. Reid (1996) reviewed the literature on self-monitoring in students with learning disabilities and found that the most common variable that was targeted by self-monitoring interventions in schools was on-task behavior. The results of the 23 articles that addressed on-task behavior with a self-monitoring intervention suggested that self-monitoring was effective at increasing on-task behavior in students with learning disabilities. Reid found support in the literature for the effectiveness of self-monitoring in large group, small group, and individual teaching formats and in regular education, resource, and self-contained classrooms. Moreover, support was found for using self-

monitoring with students aged 7 to 18 years, and the effects of the intervention were maintained for several months.

Academic productivity was another dependent variable that has been addressed by many studies, and the results of these studies were mixed (Reid, 1996). The effects of self-monitoring interventions on accuracy of responding have also been investigated with students with learning disabilities. The results of the studies were encouraging, suggesting that self-monitoring increased students' awareness of the accuracy of their responses. However, it was unclear if this increase in awareness was enough to improve accuracy of responding or if instruction in requisite skills would also be required (Reid).

Several empirical studies have suggested that self-monitoring can be an effective strategy to increase appropriate behavior in children and youth with developmental disabilities. Developmental disability is a term encompassing an array of lifelong conditions characterized by limitations in various areas, including self-care, daily living, self-direction, communication and language, economic self-sufficiency, mobility, capacity for independent living, and learning. For example, O'Reilly et al. (2002) demonstrated that self-monitoring reduced stereotyped behavior in a classroom setting for a student with a moderate severity of developmental disability. Furthermore, Hughes and Boyle (1991) found that a self-monitoring program increased task productivity for elementary students with intellectual disabilities.

Chapter 2 of this dissertation provides a comprehensive review of the use of self-monitoring by people with developmental disabilities. Results of this review revealed that 71% of the participants were trained by researchers, 14% were trained by teachers, 7%

were trained by peers trained by researchers, and 7% were trained by multiple trainers (i.e., teachers and mothers). Researchers trained participants in the majority of the studies, although researchers are not typical intervention agents. According to Horner et al. (2005), demonstrating that typical intervention agents can apply an intervention with fidelity in a typical setting enhanced the social validity of research. Assuming that enhanced social validity is important, research is needed to examine the effectiveness of self-monitoring when training is provided by typical intervention agents (e.g., teachers, parents, caregivers, peers). Demonstrations of this type are important to assess social validity of self-monitoring interventions, specifically whether people who are typically in the participant's environment (e.g., teachers, parents, caregivers) can effectively teach people with developmental disabilities to self-monitor and whether this, in turn, can improve the participant's learning and behavior. The few studies that have used typical intervention agents (e.g., teachers, mothers) have reported positive results (Hughes & Boyle, 1991; Martella, Leonard, Marchand-Martella, & Agran, 1993; Strain, Kohler, Storey, & Danko, 1994).

One of these studies (Strain et al., 1994) focused on children younger than 8 years. In this study, teachers or mothers provided social skills intervention and taught the participants to self-monitor specific social skills. Teachers were not provided with any training because it was assumed that they already had experience with social skills intervention, while assistance was provided to the mothers by the researchers throughout the study. The prompts provided by teachers were systematically faded whereas the prompts provided by mothers were not faded. Regardless of who trained the participants

with disabilities to self-monitor their social skills, similar results were obtained in the number of social initiations and the number and duration of the participants' social interactions. However, there were also differences based on who was implementing the intervention. At school, participants engaged in more social reciprocity and turn taking than at home. One of the two participants who received the intervention both at school and at home independently self-monitored more at school than at home.

There were two important limitations to the Strain et al. (1994) study. First, although teachers were instructing the participants to use the self-monitoring system, the setting of the study was not the classroom. Rather, it was a separate room in an integrated preschool. Thus, conclusions cannot be drawn from this study about the efficacy of self-monitoring systems by students with developmental disabilities in their classrooms. This research also lacked many of the quality indicators of single-subject research, including measures of treatment fidelity, generalization, maintenance, and social validity.

Given that there has been only one research study that used typical intervention agents to train young children (i.e., younger than 8 years of age) and that this study has two major limitations, future research on this topic is warranted. In addition, research that examines the effectiveness of self-monitoring interventions delivered by teachers is important because the percentage of non-overlapping data metric (PND) for the studies in which teachers delivered the intervention fell in the questionable range (i.e., average PND = 63%), whereas the studies in which a researcher delivered the intervention had PND values in the effective range (i.e., average PND = 89%). Future research may promote a better understanding of the impact of the trainer on the participant's behavior

and assist reseachers in developing strategies to support typical intervention agents to effectively implement self-monitoring interventions.

The purpose of this dissertation study was to investigate the effects of a self-monitoring treatment package and assess the impact of this training package on both teacher and student behavior in the classroom. This dissertation addresses gaps in previous self-monitoring research such as studies on the effectiveness of self-monitoring interventions that are implemented by typical intervention agents (i.e., teachers) instead of researchers. In addition, this dissertation expands previous research by delivering the self-monitoring intervention in a typical setting (i.e., the classroom) instead of an analogue setting (e.g., a separate room). Other quality indicators, such as generalization, maintenance, social validity, and treatment fidelity that were not addressed in previous studies were assessed. Lastly, this research presents a treatment package that can perhaps be used to train teachers who work with students with developmental disabilities on new skills with a relative small amount of training and supervision. The following research questions are addressed:

1. What are the effects on teacher behavior of a treatment package on self-monitoring?

2. What are the effects on student behavior of a treatment package on self-monitoring?

3. To what extent do teachers maintain the self-monitoring skills taught via the treatment package on self-monitoring?

4. To what extent do students maintain the skills targeted in self-monitoring interventions developed and implemented by their teacher?

5. To what extent do teachers generalize the self-monitoring skills taught via the treatment package on self-monitoring?

6. To what extent do students generalize the skills targeted in self-monitoring interventions developed and implemented by their teacher?

7. According to teachers, how valuable are self-monitoring interventions for young students with developmental disabilities?

CHAPTER 2

EMPIRICAL REVIEW OF SELF-MONITORING LITERATURE

Reviews of self-management interventions for students with developmental disabilities have suggested that this type of intervention can have positive effects. For instance, McDougall (1998) found that students with disabilities showed moderate to strong improvements in social and academic performance when they used self-management in their general education settings. Hughes et al. (1991) found that students with intellectual disabilities increased their independence, motivation, and academic and study skills when they used self-management. Lee et al. (2007) reported that students with autism who used self-management strategies increased appropriate play, daily living, and independent skills; showed more interaction and conversation with others; were better able to follow schedules; and showed improvements in maintaining appropriate eye gaze, using nonverbal mannerisms, and sharing.

Reviews of self-monitoring interventions for people with disabilities have also suggested positive effects. For instance, students with emotional and behavioral disorders who used self-monitoring increased their academic productivity in writing, social studies, spelling, reading, and math (Mooney et al., 2005). Moreover, people with learning disabilities used self-monitoring interventions to increase on-task behavior, academic productivity, and accuracy of responding (Reid, 1996). However, to date, there has been no systematic review of the use of self-monitoring strategies by people with developmental disabilities. This chapter provides such a review by first presenting the

results of a review of the self-monitoring literature with respect to the person who trained the participant to self-monitor.

After providing a summary of the literature, this review will comment on the literature. Specifically, the following questions will be addressed: (a) What is the effectiveness of self-monitoring interventions for children with developmental disabilities? (b) Does the effectiveness of self-monitoring vary based on participant characteristics? and (c) Does the effectiveness of self-monitoring vary based on study characteristics? Participant characteristics include type of developmental disability, age, culture, and race/ethnicity. Study characteristics include dependent variable(s), experimental design, operational definition, person who trained the participant(s), setting, reinforcement, and type of self-monitoring method used. The reported results of studies will take into consideration the quality indicators for single-subject research described by Horner et al. (2005). Potential lines of future research and concluding remarks will be presented.

Methods

Search Strategy

A computerized search was conducted using Education Resources Information Center, PsychINFO, PsycARTICLES, and Psychology & Behavioral Sciences Collection. The terms "self-monitoring" and "developmental disabilit*", "autism", "autis*", "intellectual disabilit*" or "mental retardation" were searched in the title, keyword, and full text of articles. The search was limited to journal articles written in English between 1980 and 2008. The reference sections of each of the articles identified through this

search were then hand searched to identify additional articles. Using the aforementioned search techniques and criteria, 14 articles were identified and used in this review.

Inclusion Criteria

The following criteria were used to select articles for inclusion in the review: (a) The article was an intervention study that used self-monitoring to increase appropriate behavior or decrease inappropriate behavior, and (b) participants were identified as having a developmental disability (e.g., autism, pervasive developmental disorder-not otherwise specified [PDD-NOS], Asperger's disorder, or intellectual disability). Research was not excluded on the basis of design. However, if the study included participants with and without developmental disabilities and results were not presented individually for each group, the study was excluded. Most studies that implement self-monitoring interventions include reinforcement for the appropriate use of self-monitoring skills as a component of the self-monitoring intervention. Therefore studies that included reinforcement as a component of the self-monitoring intervention were included in the review.

Data Extraction and Analysis

Studies that met the inclusion criteria were analyzed to ascertain the effectiveness of the intervention. The effectiveness of intervention was determined by the authors' reported results, including generalization, maintenance, and social validity, and by calculating the PND. The PND was calculated for each participant and study to examine treatment efficacy across the studies included in the review. The PND provides an index of behavior change that can be directly compared across studies. Guidelines for

calculating PND as specified by Scruggs and colleagues (1987, 1998) were followed. Specifically, the PND is a measure of the proportion of non-overlapping data between baseline and treatment phases and is calculated by dividing the number of treatment data points that fall above or below the lowest baseline data point by the total number of data points in the treatment phase, multiplied by 100 (Scruggs, Mastropieri, & Castro, 1987). PND scores can range from 0 to 100%, with higher scores indicating more effective treatments. Scruggs and Mastropieri (1998) recommended the following standards for evaluating PND values: Scores above 90% represent "highly effective" treatments, scores from 70% to 90% represent "effective" treatments, scores between 50% and 70% represent "questionable" treatments, and scores below 50% represent "ineffective" treatments.

Results

Table 1 shows the results of the self-monitoring research that is reviewed in this chapter. Results presented in Table 1 are listed according to type of trainer (i.e., typical intervention agents and researchers). Typical intervention agents are broken down into more specific categories, including peers trained by researchers, teachers, and teachers and mothers. A PND could not be calculated for 1 study (i.e., Strain et al., 1994), because graphs of the data were not available. Therefore, PND was calculated for only 13 studies representing 40 participants. Results will also be reported according to the findings of the author(s). Generalization, maintenance, and social validity results will also be discussed. The studies that used typical intervention agents will be discussed first.

Table 1. Results of self-monitoring research by trainer.

Reference	Results	Average PND by Study	Generali-zation Results	Maintenance Length and Results	Social Validity Raters/ Measures and Results
TYPICAL INTERVENTION AGENTS					
Peers Trained by Researchers					
Gilberts et al. (2001)	Mixed; positive results in 1-11 of 11 academic skills targeted	98%	Not assessed	Time frame not specified; mixed: positive for 2 students, 2 students required retraining, 1 student did not have enough data to draw conclusions	Teacher and student opinions; mixed results from teacher opinion; all students reported that they improved
Teachers					
Hughes & Boyle (1991)	Positive; on-task behaviors were increased	98%	Not assessed	Not conducted	Compared to typically developing students; mixed: some noticeable discrepancies
Martella et al. (1993)	Positive; positive statements increased and negative statements decreased	28%	Not assessed	2, 4, and 8 weeks; positive	Not assessed
Teachers and Mothers					
Strain et al. (1994)	Positive; increase in positive social interactions	*	Not assessed	Not conducted	Not assessed

Table 1. *(continued)*

Reference	Results	Average PND by Study	Generali-zation Results	Maintenance Length and Results	Social Validity Raters/ Measures and Results
			RESEARCHERS		
Agran et al. (2005)	Positive; increase in following directions	98%	Not assessed	1 to 2 and a half months; positive	Special education and general education teachers; positive
Coyle & Cole (2004)	Positive; decrease in off-task behavior	98%	Not assessed	2 weeks after intervention completed; positive	Not assessed
Ganz & Sigafoos (2005)	Positive; increase in work task completion and verbal requesting	100%	Not assessed	Not conducted	Not assessed
Hughes et al. (2002)	Positive; improvement in academic and social behaviors	100%	Positive across settings; average of 84%, 87%, and 97%	Time frame not specified; positive	Teachers, peers, participant (1); positive
Mace et al. (1986)	Mixed; self-monitoring alone was not enough to change behavior; positive results for self-monitoring plus reinforcement	60%	Not assessed	Not conducted	Not assessed

Table 1. *(continued)*

Reference	Results	Average PND by Study	Generali-zation Results	Maintenance Length and Results	Social Validity Raters/ Measures and Results
			RESEARCHERS		
Misra (1992)	Positive; improvement in social skills	100%	Positive; target behaviors were generalized across novel people and to natural settings	2 wks after intervention completed; variable results: positive for 1 participant, decrease in performance from intervention but still higher than baseline for 2 participants	Informal interviews with 2 of 3 participants, ratings of faculty and college students; positive
Morrison et al. (2001)	Positive; increase in initiations, requesting, commenting, and sharing	81%	Mixed; 2/4 participants showed generaliza-tion across settings	Not conducted	Not assessed
Newman et al. (2000)	Positive; increased variability in play and social language	89%	Not assessed	1 month; positive	Not assessed

Table 1. *(continued)*

Reference	Results	Average PND by Study	Generalization Results	Maintenance Length and Results	Social Validity Raters/ Measures and Results
			RESEARCHERS		
O'Reilly et al. (2002)	Positive; increase in on-task behavior	100%	Not assessed	Not conducted	Compared to 2 most well behaved children and teacher opinion; positive
Shearer et al. (1996)	Positive; social engagement increased	67%	Not assessed	Time frame not specified; positive with reservation	Not assessed

*Note. Graphs to calculate PND were not available for this study.

Then, the results of the studies that used researchers as the intervention agents will be presented.

This section provides an overview of studies by trainer. Within these categories, studies are presented in order according to the chronological age of participants. Studies with young children (i.e., ages 3 to 6 years) as participants will be discussed first, followed by studies with preteens (i.e., ages 8-12), studies with teenagers (i.e., ages 13-20), and studies with adults (i.e., ages 24-50).

Typical Intervention Agents

Peers Trained By Researchers

Young children and preteens. Of the 14 studies, only 1 study used peers trained by researchers to train the participants to use the self-monitoring interventions (i.e., Gilberts, Agran, Hughes, & Wehmeyer, 2001). Gilberts et al. used a multiple baseline design across participants with 5 participants, ages 12 to 15 years, who had intellectual disabilities. Three participants were males and 2 were females. The 5 participants used a paper and pencil self-monitoring system with verbal praise as reinforcement. This was the only study that used only verbal praise as reinforcement. The intervention was implemented in a general education middle-school classroom to promote 11 academic survival skills.

Results for the Gilberts et al. (2001) intervention were mixed; 2 participants had positive result in all academic survival skills, 2 had positive results in 9 of the 11 academic survival skills, and 1 had positive results in 7 of the 11 academic survival skills. According to the PND, the results of this intervention were highly effective. Generalization was not accessed in this study. Maintenance data were collected after the intervention was completed, but the time frame was not specified, and maintenance results were also mixed. Specifically, maintenance results were positive for 2 participants, 2 other participants required retraining, and 1 participant did not have enough data to draw conclusions. Social validity was assessed by soliciting teacher and student opinions. The social validity results from teacher opinions were mixed; teachers reported that only 4 of the 5 participants improved because, although the fifth

participant's behavior had improved a great deal, the participant required prompts to engage in self-monitoring. Social validity assessed through students' opinions was positive, with all students reporting that their behavior improved.

Teachers

Preteens. Two studies used teachers as the intervention agents with preteens: Hughes and Boyle (1991) and Martella et al. (1993). In Hughes and Boyle, teachers implemented paper and pencil self-monitoring systems without reinforcement in an elementary school self-contained classroom. Participants were 2 males and 1 female, ages 9 to 10 years, with intellectual disabilities. A multiple baseline design across behaviors was used, and the dependent variables were on-task behavior and rate of task completion. According to the PND, the results of this study were highly effective; results as reported by the authors were also positive. Generalization and maintenance were not accessed.

Hughes and Boyle (1991) argued that one way to evaluate the social validity of an intervention is to compare the behavior of students with disabilities to the behavior of students without disabilities after intervention; however, in some cases, the authors acknowledged that it may not be realistic to have the same norms, particularly for students with significant disabilities. Hughes and Boyle reported mixed results when they measured social validity. Noticeable discrepancies between the students with disabilities and the students without disabilities were found even after the self-monitoring intervention. Hughes and Boyle suggested that the participants' motor abilities may have influenced their rate of production. This explanation is plausible considering that the lowest rates of production were seen in tasks that required fine motor movements.

Martella et al. (1993) also used teachers as the intervention agents. In their study, student teachers trained a 12-year-old preteen boy with intellectual disability to use a paper and pencil self-monitoring intervention. The participant monitored his negative statements in his special education classroom. According to the PND, the intervention was ineffective. However, according to the authors, the results were positive given that the participant's positive statements increased and negative statements decreased.

Of the 14 studies reviewed, Martella et al. (1993) was the 1 study that was characterized as ineffective according to the PND metric, yet the authors reported positive results. This discrepancy may be due to the significant overlap between baseline and intervention conditions, which led to a low PND value. However, by the end of the intervention, the rate of negative statements per minute was lower than at the lowest point of baseline, and was maintained 2, 4, and 8 weeks after the study ended. This led the authors to conclude that the effects of the self-monitoring interventions were lasting and positive. Generalization and social validity were not assessed.

Teachers and Mothers

Young children. Strain et al. (1994) used both teachers and mothers as intervention agents to teach young children to use a self-monitoring system. Strain et al. used a multiple baseline design across participants and settings to study teachers and mothers who provided social skills intervention and taught the participants to self-monitor positive social interactions. Teachers led the intervention in a room in the preschool, but the room was not the classroom. For 2 of the 3 participants, the intervention was also implemented at home by the participants' mothers. Participants

were 3 boys with autism, ages 3 to 5 years. The participants used three-dimensional objects (i.e., placing disks in a container) to self-monitor, and they received edible reinforcement (e.g., crackers, candy, potato chips, etc.) as part of the self-monitoring system.

There were several differences between the sessions led by teachers and those led by mothers in the Strain et al. (1994) study. First, teachers were not provided with training because it was assumed they already had experience with social skills intervention, whereas assistance was provided to mothers by the researchers throughout the study. Also, the prompts provided by teachers were systematically faded whereas the prompts provided by mothers were not faded. However, regardless of who trained the participants with disabilities to self-monitor their social skills, similar results were obtained in the number of social initiations and the number and duration of the participants' social interactions. However, there were also several differences based on who was implementing the intervention. At school, participants engaged in more social reciprocity and turn taking than at home, and 1 of the 2 participants who received the intervention both at school and at home independently self-monitored more frequently at school than at home. Generalization, maintenance, and social validity were not assessed, and the graphs to calculate PND were not available for this study.

Researchers

Young Children

Shearer, Kohler, Buchan, and McCullough (1996) implemented a self-monitoring intervention with three 5-year-old boys with autism using a multiple baseline design

across settings. The participants used three-dimensional objects (i.e., moving beads) for self-monitoring, and "small rewards" were used as reinforcement. The target behaviors were activity engagement and independent social interactions. The intervention took place in a small playroom within an integrated school but not in a classroom. The authors reported positive results, with overall increases in social engagement during the self-monitoring intervention. However, because there was overlap between baseline and intervention conditions, the PND indicated that the results of the intervention were questionable. Maintenance was assessed but the time frame was not specified. Shearer et al. reported positive results with reservations because they anticipated that performance would have continued to increase if follow-up data had been collected. Generalization and social validity were not assessed.

Another study of young children was conducted by Newman et al. (2000) using a multiple baseline design across participants. Varied responding in play and social language were targeted in this self-monitoring intervention for 3 preschool children with autism and intellectual disabilities. The participants were three 6-year-old children, 2 boys and 1 girl. The self-monitoring systems were used in a school-aged program for children with autism for 2 participants and at home for 1 participant. The self-monitoring system utilized three-dimensional objects (i.e., tokens), and reinforcement included time in the computer room, time in the gym, and sweets. Newman et al. reported positive results, with increases in variability in play and social language, and the PND indicated that the intervention was effective. Maintenance was assessed 1 month after intervention, and results were also positive. Generalization and social validity were not assessed.

Preteens

Coyle and Cole (2004) conducted a study with 3 male preteens, ages 9 to 11 years, with autism and intellectual disabilities. Off-task behavior was targeted, and the self-monitoring intervention was implemented in the participants' special education classroom. Participants used paper and pencil self-monitoring interventions with stickers and popcorn as reinforcers. Reinforcers were selected by consulting with the teachers. All participants were trained to self-reinforce or deliver reinforcement to themselves rather than having another person deliver the reinforcement. In this study, a timer beeped after a 30-s interval. Participants then pushed a button to stop the timer, noted if they had been working or not working during the interval, and self-reinforced by taking a piece of popcorn or a sticker when they were on-task during the entire interval.

An A-B-A-BF-IF (BF-baseline follow-up; IF-intervention follow-up) withdrawal design was used for Studies 1 and 2 and an A-B-A-C-A design was used for Study 3. Coyle and Cole (2004) reported that off-task behavior decreased, and the PND suggested that the results were highly effective. Maintenance was assessed 2 weeks after the intervention was completed, and positive results were found. Generalization and social validity were not assessed.

Preteens and Teenagersf

Morrison, Kamps, and Garcia (2001) conducted a study with preteens and teenagers with autism who were trained by researchers to self-monitor. Participants were 3 males and 1 female, ages 10, 11, 11, and 13 years, respectively. The intervention took place in an empty classroom, a conference room, and an open area between classrooms in

a public school. A paper and pencil self-monitoring intervention with candy, stickers, and praise as reinforcement was used to increase requesting, commenting, and sharing by the participants. A multiple baseline design across skills and a counterbalanced reversal design were used. Morrison et al. reported positive results, with increases in initiations, requesting, commenting, and sharing, and the self-monitoring intervention was effective according to the PND. Generalization across settings was assessed, and results were mixed given that only half of the participants showed generalization across settings. Maintenance and social validity were not assessed.

Teenagers

Four studies used researchers to train teenagers to self-monitor. O'Reilly et al. (2002) conducted a paper and pencil self-monitoring intervention that included verbal praise and an ink stamp as reinforcement with a 13-year-old female with a developmental disability. The intervention targeted on-task behavior and took place in a "lower ability" classroom. A multiple baseline design across settings with a withdrawal design was used. O'Reilly et al. reported positive results, with an increase in on-task behavior, and the PND indicated that the intervention was effective. Social validity was assessed by comparing the behavior of the participant to that of the two most "well-behaved" children in the participant's classroom. After the self-monitoring intervention was implemented, the participant's on-task behavior was similar to the behavior of these 2 children. Generalization and maintenance were not assessed.

Agran et al. (2005) used a paper and pencil self-monitoring intervention without reinforcement in a junior-high general education classroom. Within a multiple baseline

design across participants, 6 teenagers, ages 13 to 15 years with various developmental disabilities (i.e., autism, Asperger's Disorder, and intellectual disability), self-monitored whether they followed directions. The authors stated that the dependent variable was operationally defined, but they did not provide a definition in the article. One participant was African American and 5 were Caucasian. Participants increased their ability to follow directions, and according to the PND, the results of the intervention were highly effective. Generalization was not assessed. Maintenance data were collected between 1 and 2.5 months after the intervention was completed, and the results were positive. The special education and general education teachers rated social validity, and all teachers reported positively on the self-monitoring intervention.

Hughes et al. (2002) conducted a study with teenage participants that used researchers as intervention agents. Hughes et al. used a multiple baseline across participants design to implement self-monitoring interventions with 3 male and 2 female students with autism and intellectual disabilities, ages 16 to 19 years. Three participants were Caucasian and one was African American. Participants used either paper and pencil or visual cues to self-monitor academic and social behavior in their high school's general education classroom. Reinforcement was not used with self-monitoring. The authors reported positive results, with improvement in academic and social behavior, and the PND suggested that the intervention was highly effective. The participants' behavior generalized across settings, and the authors reported positive results for maintenance, although the time frame for maintenance was not specified. Social validity was measured

by asking the opinions of teachers, peers, and 1 participant. All raters reported positive results on the social validity measure.

The fourth study with teenage participants trained by researchers was conducted by Ganz and Sigafoos (2005). Ganz and Sigafoos trained a 19-year old Caucasian male with autism and intellectual disability and a 20-year old Mexican-American male with autism to use a three-dimensional self-monitoring system (taking tokens or snap blocks from a container) to promote work task completion and verbal requesting, respectively, in a self-contained vocational public school. This study used a changing criterion design, and preference assessments were conducted to select reinforcers for use with the self-monitoring systems. The researchers trained 1 of the 2 participants to use self-reinforcement. The other participant was also reinforced for engaging in target behavior, but the researcher delivered the reinforcement. The authors reported positive results, with increases in work task completion and verbal requesting, and the PND indicated that the intervention was highly effective. Generalization, maintenance, and social validity were not assessed.

Adults

Of the 14 studies reviewed, 2 used adult participants trained by researchers: Misra (1992) and Mace, Shapiro, West, Campbell, and Altman (1986). Misra (1992) conducted a study with 2 males and 1 female participant, ages 24 to 28 years, with intellectual disabilities. Participants used three-dimensional objects to self-monitor within a multiple baseline design across participants. Target behaviors were social skills, which included interacting with customers, asking more questions, and decreasing number of repetitions

in a conversation. The participants were taught to self-monitor in an observation room at a university. The authors reported positive results, with improvement in social skills for all participants, and the self-monitoring intervention was highly effective according to the PND. The authors also reported positive results for generalization across settings and people. Maintenance was measured 2 weeks after the intervention was completed, and the authors reported variable results. More specifically, positive results were reported for 1 participant, and the other 2 participants showed decreases in performance from the intervention phase, but the maintenance data were better than at baseline. Social validity was assessed through informal interviews with 2 of the 3 participants and through ratings from faculty and college students. Participants, faculty, and college students all reported positively on the self-monitoring intervention.

The other study with adult participants trained by researchers was conducted by Mace et al. (1986). Mace et al. used self-monitoring to increase units of work produced in 1-minute by 3 adults with intellectual disabilities in their sheltered workshop. The participants were 1 male and 2 females, ages 33, 28, and 50 years, respectively. The participants used three-dimensional objects to self-monitor. This study compared the effectiveness of self-monitoring alone, self-monitoring plus reinforcement, and reinforcement alone. In the self-monitoring alone phase, the authors reported mixed results, and according to the PND, the results were questionable. Mace et al. found that self-monitoring alone was not sufficient to change the work/academic behavior of the adult participants. However, during another phase of the study, reinforcement (i.e., praise and money) was added to the self-monitoring intervention, and positive results were

reported. Because the study used a withdrawal design, the interdependence of self-monitoring and reinforcement was evident. That is, when reinforcement was withdrawn, levels of target behavior returned to baseline. This study did not assess generalization, maintenance, or social validity.

Discussion

What is the Effectiveness of Self-Monitoring Interventions for Children with Developmental Disabilities?

The average PND across studies was 89% and ranged from 28% to 100%, suggesting that, based on the body of research included in this review, self-monitoring was an effective treatment for increasing appropriate behavior in individuals with developmental disabilities. Results were highly effective for 62% (n = 8) of studies, effective for 15% (n = 2), questionable for 15% (n = 2), and ineffective for 8% (n = 1). Interestingly, the authors reported positive results for 86% (n = 12) of the studies and mixed results for 14% (n = 2) of the studies. The authors of the 1 study that was characterized as ineffective according to the PND metric (i.e., Martella et al., 1993) reported positive results for the intervention. This discrepancy may be due to the overlap between the baseline and intervention conditions, which led to a low PND value. However, by the end of the intervention, the rate of negative statements per minute was lower than at the lowest point of baseline, and was maintained at 2, 4, and 8 weeks after the study ended. This may have led the authors to conclude that the intervention had a lasting, positive effect. One study whose authors reported mixed results and had questionable results according to the PND (i.e., Mace et al., 1986) found that self-

monitoring alone was not sufficient to change the work/academic behavior of adults. However, during another phase of the study when the researchers added reinforcement (i.e., praise and money) to the self-monitoring intervention, positive results were obtained, suggesting reinforcement is an important component of self-monitoring interventions. Reinforcement will be discussed in greater length in the section below on study characteristics.

The other study (Shearer et al., 1996) whose authors reported mixed results and had questionable results according to the PND metric found an overall increase in social engagement during self-monitoring intervention. However, there was a great deal of overlap between baseline and intervention conditions. The authors' conclusion was based on an increase in performance toward the end of the study. They suggested that performance would have continued to increase if additional follow-up data had been collected; however, such data were not available. This does illustrate, however, the importance of collecting follow-up and maintenance data to examine the degree to which behaviors promoted by self-monitoring interventions are maintained over time. Maintenance will be discussed in greater detail in the section on quality indicators.

Does the Effectiveness of Self-Monitoring Vary Based on Participant Characteristics?

To evaluate the impact of participant characteristics on the efficacy of the self-monitoring interventions, average PND values were calculated based on the participants' disability, age, gender, and race/ethnicity (see Table 2). Because of the small number of studies included in the review, these values must be interpreted with caution. However,

Table 2. Average PND by Participant Characteristics

Disability	Average PND
Intellectual disability	90%
Autism	78%
Autism and intellectual disability	89%
Developmental disability	100%
Asperger's; intellectual disability	97%
Age	**Average PND**
Young children (ages 3 to 6 years)	76%
Preteens (ages 8 to 12 years)	85%
Teenagers (ages 13 to 20 years)	99%
Adults (ages 24 to 50 years)	80%
Gender	**Average PND**
Females	93%
Males	90%
Race/Ethnicity	**Average PND**
African American	100%
Caucasian	98%
Mexican-American	100%

examination of the trends can provide preliminary direction for future research. Below are the results by participant characteristics, both as reported by the authors and as indicated by the PND.

Disability Label

Fifty percent (n = 21) of participants had a diagnosis of intellectual disability, 25% (n = 11) had a diagnosis of autism, 21% (n = 10) had a diagnosis of autism and intellectual disability, 2% (n = 1) had a diagnosis of Asperger's and intellectual disability, and 2% (n = 1) had a diagnosis of developmental disability. As shown in Table 2, there was some variation in the average PND value based on disability label. PND tended to be

highest for participants with a developmental disability (M=100%) and lowest for participants with autism alone (M=78%). However, all values fell into the effective or highly effective range, suggesting that self-monitoring interventions were effective for students with varying disability labels and that that level of cognitive ability did not appear to impact the effectiveness of self-monitoring interventions, given that the PND was higher for participants who had both autism and an intellectual disability compared to participants who had autism only.

Age

The participants in the studies ranged in age from 3 to 50 years. Of the 44 participants, 20% (*n* = 9) were young children (ages 3 to 6 years), 30% (*n* = 13) were preteens (ages 8 to 12 years), 36% (*n* = 16) were teenagers (i.e., ages 13 to 20 years), and 14% (*n* = 6) were adults (i.e., ages 24 to 50 years). Regarding the effectiveness of self-monitoring interventions based on age, teenagers tended to have the highest PND value (99%), suggesting that self-monitoring interventions for teenagers were highly effective (see Table 2). Interventions implemented with young children, preteens, and adults fell in the effective range, with the PND for preteens being highest (85%), followed by adults (80%) and children (76%). These PND values suggest that self-monitoring interventions were effective for people with developmental disabilities of all ages and were especially effective for teenagers (i.e., 13 to 20 years).

Gender

Regarding gender, 77% (*n* = 34) of participants were male and 23% (*n* = 10) were female. On average, the PND for females was 93% and the PND for males was

90%. Thus, the effectiveness of self-monitoring intervention did not differ based on gender.

Race/Ethnicity

With regard to the race/ethnicity of participants, only 19% (n = 3) of studies reported race/ethnicity information. These three studies had a total of 11 participants, and 58% (n = 7) of the participants were Caucasian, 33% (n = 3) were African-American, and 9% (n = 1) were Mexican-American. Moreover, the average PND for African-Americans and Mexican-Americans was 100% and was 98% for Caucasians. Therefore, the limited results from the three studies that reported race/ethnicity information suggest that self-monitoring interventions were highly effective for Caucasian, African American, and Mexican-American participants with developmental disabilities. However, given that only 19% of the studies reported the race/ethnicity of participants, these results cannot be assumed to generalize to people who are culturally and linguistically diverse.

Does the Effectiveness of Self-Monitoring Vary Based on Study Characteristics?

Type of Research Design

All studies in this review used single-subject design methods that establish experimental control: 79% used a multiple baseline design (n = 11), 14% (n = 2) used a withdrawal design, and 7% (n = 1) used a changing criterion design. Most of the studies used a multiple baseline or reversal design. The multiple baseline design controls for maturation and practice effects (Richards, Taylor, Ramasamy, & Richards, 1999), and a causal relation can be inferred from this design because the independent variable is systematically introduced across participants or settings. According to Baer, Wolf, and

Risley (1968), the multiple baseline design is the most appropriate single-subject design when withdrawal of treatment is not feasible or ethical. When the dependent variable can be reversed, the withdrawal design is considered to be very powerful (Richards et al.). A causal relation can be inferred from this design, and it is useful in ruling out threats to internal validity because the independent variable is systematically introduced and withdrawn.

Two quality indicators are that the design of a study controls for threats to internal validity and that the researchers maximize external validity by replicating across materials, participants, or settings (Horner et al., 2005). One way to address these criteria is to use an appropriate research design. As indicated, all studies used single-subject design methods that establish experimental control.

Results were examined to determine if there was a difference in efficacy of the studies due to the study characteristics (see Table 3). The average PND value for studies that used the multiple baseline design was 92% (range 50-100%), for changing criterion 76% (range 28-100%), and for withdrawal designs 75% (range 80-100%). Although each design fell in the effective range, the average PND value tended to be higher for studies utilizing multiple baseline designs.

Dependent Variable

There were various dependent variables in the studies. Of the 14 studies, 7% (n = 1) targeted play and social skills, 14% (n = 2) targeted social and work/academic skills, 29% (n = 4) targeted social skills, and 50% (n = 7) targeted work/academic skills. The PND for work/academic skills was highest, followed by play and social skills, social and

work/academic skills, and social skills. More specifically, the PND suggests that self-monitoring interventions that targeted work/academic skills were highly effective, and

Table 3. Average PND by Study Characteristics.

Design	Average PND
Multiple baseline design	92%
Changing criterion design	76%
Withdrawal design	76%
Dependent Variable	**Average PND**
Work/academic skills	93%
Play and social skills	89%
Social and work/academic	84%
Social skills	70%
Setting	**Average PND**
General education classroom	99%
Multiple settings	89%
Special education classroom	85%
Analogue setting	83%
Sheltered workshop	60%
Trainer	**Average PND**
Peers trained by researchers	98%
Researchers	89%
Teachers	63%
Multiple trainers	*
Self-monitoring materials	**Average PND**
Paper and pencil	86%
Three-dimensional	83%
Other	*
Reinforcement	**Average PND**
Self-monitoring and self-reinforcement	99%
Self-monitoring and no reinforcement	86%
Self-monitoring and reinforcement	84%
Self-monitoring and reinforcement delivered by another	82%

*Note. Graphs to calculate PND were not available for this study

self-monitoring interventions that targeted play and social skills, social and work/academic skills, and social skills were effective. When examining the dependent variable, the following quality indicators must be taken into account: operational definition, interobserver agreement, treatment fidelity, and social validity. Below are characteristics regarding each of these quality indicators.

Operational definition. One quality indicator is that the dependent variables must be operationally defined (i.e., Horner et al., 2005). Operational definitions enable readers to better understand the research and are necessary to replicate research. Most of the studies (86%; n = 12) reported clear operational definitions of the dependent variables. However, 1 study indicated that the dependent variable was operationally defined but did not include the definition (i.e., Agran et al., 2005), and 1 study did not provide an operational definition of the dependent variable (i.e., Newman et al., 2000). The PND value for studies that used operational definitions was effective (M=85%) whereas the average PND for studies that did not use operational definitions was highly effective (M=94%). This finding suggests that the degree to which an operational definition was included in the study does not necessarily influence the efficacy of the intervention; however, it does make replication of the study difficult.

Interobserver agreement and treatment fidelity. Obtaining high levels of interobserver agreement (i.e., 80% or above) is another quality indicator of single-subject research (Horner et al., 2005). All 14 studies assessed interobserver agreement, and the agreement was above 80% in all studies, suggesting that the dependent variables were well defined and easily measured. On the other hand, treatment fidelity/procedural

interobserver agreement was not assessed in 71% (n = 10) of studies. The PND for the studies that did not assess treatment fidelity (M=84%) suggests that although the interventions were effective, replication is needed because the lack of treatment fidelity data leads to questions regarding the degree to which the intervention was implemented as described by the authors. In the four studies that assessed treatment fidelity, the results suggested that researchers and peer tutors trained by researchers were able to implement self-monitoring interventions with fidelity. The average PND for these four studies was similar to the average PND of studies that did not assess treatment fidelity (M=91%), which suggests that, similar to operational definitions, the assessment of treatment fidelity may not necessarily influence the efficacy of the intervention, but the degree to which we can conclude that the intervention was implemented as described is compromised. Measuring fidelity of treatment is an important indicator of high quality research (Horner et al., 2005); thus, the finding that this quality indicator was not present in most of these studies is troubling. Moreover, interobserver agreement, treatment fidelity, and operational definitions all contribute to reliable data measurement.

Social validity. Another quality indicator is that the dependent variables are socially important. The dependent variables in all of the studies appeared to be socially important; all dependent variables were skills that were important in the environments in which the participants were living, learning, working, and playing. However, social validity was not systematically evaluated in 57% (n = 8) of studies. Of the six studies that did assess social validity, four reported positive results (i.e., 67%) with the other two studies (i.e., 33%) reporting mixed results. In five of the six studies, social validity was

assessed by asking teachers their opinions about the effectiveness of the intervention. Generally, teachers had positive comments about the self-monitoring intervention. However, in 1 study in which the authors reported mixed results (i.e., Gilberts et al., 2001), teachers reported that the students' behavior had improved a great deal, but that one student required prompts to engage in self-monitoring. Three studies asked the opinions of the participants with disabilities regarding the intervention. All students evaluated the intervention positively. Two studies also asked the participants' peers about their perceptions of the effectiveness of the intervention, and the peers evaluated the intervention positively in both studies. However, when social validity was assessed by comparing the behavior of the participants with disabilities to the behavior of peers without disabilities, noticeable discrepancies were found.

These findings suggest that, generally, both participants and intervention agents found the self-monitoring interventions to be acceptable and meaningful for the participant. However, there may be some instances when self-monitoring may not be appropriate given an individual's needs or the demands of the classroom. The lack of a measure of social validity in more than half of the articles is a concern, given the importance of assessing social validity. If participants, parents/caretakers, and/or teachers are not satisfied with a treatment, they are unlikely to adhere to it.

Setting

The setting of the self-monitoring interventions varied. Thirty-six percent (n = 5) took place in special education classrooms, 21% (n = 3) took place in general education classrooms, 21% (n = 3) took place in analogue settings (e.g., an observation room at a

university or at the school but not in the classroom), 14% (n = 2) used multiple settings for some participants (e.g., school and home), and 7% (n = 1) took place in a sheltered workshop for people with intellectual disabilities. Results of studies that took place in general education classrooms were highly effective (average PND = 99%). Studies that took place in multiple settings, special education classrooms, and analogue settings were effective (average PND = 89%, average PND = 85%, and average PND = 83%, respectively), and studies that took place in sheltered environments had questionable results (average PND = 60%). Generalization and maintenance are two quality indicators that will be considered in this section regarding the setting of the studies.

Generalization. Generalization was not assessed in 79% (n = 11) of the studies. Of these three studies that assessed generalization, the authors reported positive results for generalization across settings and people for 1 study (i.e., Misra, 1992) and positive results for generalization across settings for another study (i.e., Hughes et al., 2002). However, 1 study showed mixed results (i.e., Morrison et al., 2001), with only half of the participants showing generalization across settings. Given that only a small proportion of studies addressed generalization, more research is needed to further evaluate the generalizability of skills learned through self-monitoring.

Maintenance. Regarding maintenance, 43% (n = 6) of studies did not assess the maintenance of skills over time. Of the 8 studies that did assess maintenance over time, 88% (n = 7) of the authors reported that the improvements in target skills were maintained over time, and 12% (n = 1) showed mixed results because 1 participant required retraining in self-monitoring to maintain levels of target behavior. Future

research should include assessments of generalization and maintenance to determine the degree to which such skills generalize across people and settings and are maintained over time.

Trainers

The trainers who taught participants to self-monitor their behavior were researchers in 71% (*n* = 10) of studies, teachers in 14% (*n* = 2) of studies, peers trained by researchers in 7% (*n* = 1) of studies, and multiple trainers (teachers and mothers) in 7% (*n* = 1) of studies. The average PND was the highest (M=98%) for participants who were trained by peers trained by researchers, followed by participants trained by researchers (average PND=89%), and participants trained by teachers (M=63%). Thus, when peers trained by researchers trained participants to use self-monitoring interventions, the intervention was highly effective; when researchers trained participants to use self-monitoring interventions, the intervention was effective; and when teachers trained participants to use self-monitoring interventions, the results of the interventions were questionable. The PND could not be calculated for the 1 study that used multiple trainers.

Self-Monitoring Material

With regard to the type of materials used for self-monitoring, 50% (*n* = 7) of studies used paper and pencil worksheets (i.e., checking yes or no boxes, putting a "+" in one column when on task and a "-" in another column when off task, or placing a mark under a "working" or "not working" column); 43% (*n* = 6) used three-dimensional objects (i.e., blocks, beads, disks, tokens placed in a container, golf counter, or wooden

rings placed on a dowel); and 7% (n = 1) used other methods (i.e., visual cues for participants with severe physical disabilities unable to manipulate a three-dimensional object or complete a worksheet). The average PND for studies that used paper and pencil materials to self-monitor was 86% and the average PND for studies that used three-dimensional self-monitoring materials was 83%. Thus, PND values of studies using both paper and pencil and three-dimensional objects were in the effective range. The PND could not be calculated for the 1 study that used other methods to self-monitor.

Reinforcement

Most studies, 64% (n = 9) provided reinforcement as a component of the self-monitoring intervention, while the remaining 36% (n = 5) of studies did not report the use of reinforcement during the intervention. In seven of the studies, teachers or researchers provided reinforcement to the students after they correctly used self-monitoring skills. One study trained all participants to self-reinforce or deliver reinforcement to themselves (i.e., Coyle & Cole, 2004) rather than having another person delivered the reinforcement. In this study, a timer beeped after a 30-s interval. Participants pushed a button to stop the timer, noted if they had been working or not working during the interval, and self-reinforced by taking a piece of popcorn or a sticker when they were on-task during the entire interval. Another study trained 1 of the 2 participants to use self-reinforcement (i.e., Ganz & Sigafoos, 2005). The other participant was also reinforced for engaging in target behavior, but the researcher provided the reinforcement.

In the 9 studies that provided reinforcement as a component of the intervention, 56% (n = 5) of studies faded the reinforcement over the course of the study. Moreover, of

these 9 studies, 67% (n = 6) did not specify how the reinforcers for the participants were identified. In the remaining studies (n = 3), 1 study reported conducting a preference assessment to identify reinforcers (i.e., Ganz & Sigafoos, 2005), another study reported consulting with the teacher to select reinforcers (i.e., Coyle & Cole, 2004), and the third study used only verbal praise as a reinforcer (i.e., Gilberts et al., 2001).

The average PND for studies that did not use reinforcement in conjunction with self-monitoring was 86% (range 0-100%), whereas the PND for studies that used reinforcement and self-monitoring was 84% (range 28-100%). For the studies that used reinforcement, the PND for the 3 participants in the two studies that used self-reinforcement was 99% (range 96-100%), which was higher than the average PND of 82% (range 28-100%) obtained for participants who had reinforcers delivered by another person. These PND values suggest that self-monitoring interventions with and without reinforcement were effective, and that when reinforcement was used, self-reinforcement contributed slightly more to the efficacy of an intervention than reinforcement delivered by others.

Future Research

There are several areas that need to be investigated in future research. These areas include trainers, setting, and age. In addition, future research should include generalization, maintenance, and treatment fidelity. Each area is described below.

Trainers

In the 14 studies reviewed, most (71%) of the participants were trained by researchers. To ensure that people who are typically in the participant's environment

(e.g., teachers, parents, caregivers) can effectively teach people with developmental disabilities to self-monitor and that this in turn will change the participant's behavior, future research should examine the effectiveness of self-monitoring when the training is provided by typical intervention agents (e.g., teachers, parents, caregivers, peers). Moreover, research that examines the effectiveness of self-monitoring interventions delivered by teachers is important given that the PND for the studies in which teachers delivered the intervention fell in the questionable range (average PND = 63%), whereas the studies in which the researcher delivered the intervention all showed PND values in the effective range (average PND = 89%). Future research will help us to better understand the impact of the trainer on the participant's behavior and to develop strategies to support typical intervention agents to effectively implement self-monitoring interventions.

Future research can build on the work of Strain et al. (1994), in which teachers or mothers provided social skills intervention and taught the participants to self-monitor specific social skills targeted by the intervention. Teachers were not provided with training because it was assumed they already had experience with social skills intervention, whereas assistance was provided to the mothers by the researchers throughout the study. Also, the prompts provided by teachers were systematically faded whereas the prompts provided by mothers were not faded. However, regardless of who trained the participants with disabilities to self-monitor their social skills, similar results were obtained in the number of social initiations and the number and duration of the participants' social interactions. However, there were also several differences based on

who was implementing the intervention; at school, participants engaged in more social reciprocity and turn taking than at home. In addition, 1 of the 2 participants who received the intervention both at school and at home independently self-monitored more at school than at home. Given the findings of Strain et al., future research is needed to better understand the impact of the trainer on the participant's behavior and to develop strategies to support teachers and parents to effectively implement self-monitoring interventions.

Setting and Age

Setting

The interventions targeting the various dependent variables took place in multiple settings. Play and social skills were addressed across multiple settings (i.e., special education classroom and home). Social skills were assessed in analogue settings (i.e., observation room at a university), multiple settings (i.e., school and home), and special education classrooms. Social skills and work/academic skills were assessed in analogue settings (i.e., small playroom in a school) and general education classrooms. Work/academic skills were assessed in general education classrooms, sheltered workshops for people with intellectual disabilities, and special education classrooms. A variety of skills can be addressed with self-monitoring, but more work needs to be done in natural settings, such as classrooms and homes, to determine the effectiveness of using self-monitoring in natural settings.

Age and Setting

Only one research study used typical intervention agents to train young children (i.e., younger than 8 years of age) with developmental disabilities to use self-monitoring interventions (i.e., Strain et al., 1994). Moreover, there were several important limitations to this study. First, the setting of the study was not the classroom; rather, it was a separate room within the integrated preschool. In addition, the research study lacked many of the quality indicators of single-subject research, including treatment fidelity, generalization, maintenance, and social validity. Future research is needed to evaluate the effectiveness of self-monitoring interventions when used by students with developmental disabilities who are trained by typical intervention agents to implement the self-monitoring intervention in the classroom.

Generalization, Maintenance, and Treatment Fidelity

Most of the studies did not assess generalization. The few studies that did assess generalization found positive results, suggesting that skills learned through self-monitoring can be effectively generalized. Given that only a small proportion of studies addressed generalization, more research is needed to support the generalizability of skills learned through self-monitoring.

About half of the studies did not assess maintenance. Given the critical importance of generalization and maintenance of skills to the outcomes experienced by students with development disabilities, future research should more systematically examine the degree to which self-monitoring interventions and the skills they promote can be generalized and maintained over time. Treatment fidelity was assessed in only

about three-fourths of the studies. Future research should examine treatment fidelity to determine the degree to which an intervention can be implemented interobserver agreement by different intervention agents.

Age and Social Validity

Future research must also continue to assess the social validity of self-monitoring interventions from the perspective of people with developmental disabilities and teachers/parents/caregivers. The lack of a measure of social validity in more than half of the articles reviewed in this study is a concern. Moreover, the ages of the participants of studies that assessed social validity ranged from 9 to 28 years. Positive results for social validity were reported for studies with participants ranging in age from 13 to 28 years, and mixed results were found for participants ranging in age from 9 to 13 years. Given the lack of social validity reported in the majority of past research and the variable results of the research that did assess social validity, future research needs to investigate the role of age in the perceived social validity of self-monitoring intervention.

Concluding Remarks

With regard to the three questions posed at the beginning of this review, the body of research on the use of self-monitoring by people with developmental disabilities suggests that self-monitoring intervention holds significant promise. Results suggest that a variety of appropriate behaviors (e.g., play, social, and work/academic skills) can be increased with self-monitoring interventions. Self-monitoring interventions resulted in treatment levels above the highest baseline data point 89% of the time. There was, however, some variation in the efficacy of the interventions based on characteristics of

the participants and the studies. The majority of the intervention studies met the criteria for high-quality single-subject research, although more attention needs to be devoted to the assessment of treatment fidelity, generalization, maintenance, and social validity. Future research that further explores issues related to implementing strategies with typical intervention agents, in typical settings, and with young children (i.e., ages 8 years and under) is needed. In addition, more attention needs to be devoted to the assessment of treatment fidelity, generalization, maintenance, and social validity. The role of age in the perceived social validity of self-monitoring intervention also needs to be investigated. Given the positive impact of self-monitoring interventions on a variety of behaviors and the role that self-monitoring plays in promoting important goals such as independence and self-determination, increased attention should be directed to this promising area.

Research Questions

The purpose of this dissertation study was to examine the effects of a self-monitoring treatment package on both teacher and student behavior in the classroom. The self-monitoring intervention package consisted of a short (M=50 min) teacher training on self-monitoring, feedback on the self-monitoring intervention developed by the teacher (M=46 min), feedback to teachers while training the student to self-monitor, and feedback to teachers while they implemented the self-monitoring intervention in the classroom until they implemented the self-monitoring intervention with fidelity of 80% or above across 3 consecutive sessions without researcher feedback.

One gap in self-monitoring research on people with developmental disabilities is that most previous research has used researchers as the intervention agents. The current

study addresses this gap by investigating the effectiveness of self-monitoring interventions that are implemented by teachers. In addition, this study extends previous research by delivering the self-monitoring intervention by teachers in the classroom, whereas Strain et al. delivered the intervention in a separate room. This study also expands on previous research by assessing treatment fidelity, whereas only one of the previous studies that used typical intervention agents assessed fidelity of treatment. Lastly, the current study addressed quality indicators such as generalization, maintenance, and social validity that were not accessed in many of the studies reviewed.

The following research questions were addressed:

1. What are the effects on teacher behavior of a treatment package on self-monitoring?

2. What are the effects on student behavior of a treatment package on self-monitoring?

3. To what extent do teachers maintain the self-monitoring skills taught via the treatment package on self-monitoring?

4. To what extent do students maintain the skills targeted in self-monitoring interventions developed and implemented by their teacher?

5. To what extent do teachers generalize the self-monitoring skills taught via the treatment package on self-monitoring?

6. To what extent do students generalize the skills targeted in self-monitoring interventions developed and implemented by their teacher?

7. According to teachers, how valuable are self-monitoring interventions for young students with developmental disabilities?

CHAPTER 3

METHODS

Setting

Participants were recruited from a private, non-profit school for children with communication disorders. The school had a teacher-to-student ratio of 1:2 or 1:3. Each classroom teacher had one to two supporting teachers. In addition, there was a speech therapist (SLP), occupational therapist (OT), and board certified behavior analyst (BCBA) on staff who worked with the students to support them in meeting the goals and objectives on their Individualized Treatment Plan (ITP). The therapists provided individual and/or group therapy to all students. Therapists also provided the teachers with consultation time to ensure that the speech, fine and gross motor, and behavior goals were targeted throughout the students' day. Teachers and therapists met on a weekly basis to consult and collaborate on students' treatment. The program director at the school, a BCBA with 8 years of experience teaching children with developmental disabilities on both an individual and group basis, provided ongoing training and support to all school staff.

Teacher Participants

The participants for this study were 4 classroom teachers from the school who met three inclusion criteria. First, teachers taught a class that included at least three students who were between the ages of 3 and 5 years and who had been diagnosed as having a developmental delay or disability, such as autism or PDD-NOS. Second, teachers identified students in their classroom for whom it was an educational priority to

increase the students' appropriate classroom behavior. These potential students were identified during informal interviews with the teachers. Third, the teachers reported that the students they selected were able to discriminate between occurrences and non-occurrences of appropriate classroom behavior, given that this is a necessary skill for self-monitoring. A checklist was used to determine if a student met the inclusion criteria described above (see Appendix A). The researcher utilized the checklist in an interview manner with each teacher participant to identify student participants. If more than one student met the inclusion criteria, teachers were asked to select the one student that they felt would benefit the most from a self-monitoring intervention and had the greater need to increase appropriate classroom behavior to participate in the study.

Teacher participants ranged in age from 23-31 years old. Seventy five percent of teachers were Caucasian, and for 75% of the teachers, this was their first year teaching in a special education classroom. Two teachers had a Bachelor's degree and two had a Master's degree. All teachers were new to the school. A summary of teacher participants appears in Table 4.

Table 4. Teacher participant information.

Teacher's Name	Age	Race/ Ethnicity	Education	Years of Experience Teaching Special Education
Beatriz	34	Hispanic/ Caucasian	M.Ed. in Education; Third year doctoral student	0
Anna	31	Caucasian	M.Ed. in Special Education	0
Lizette	30	Caucasian	B.A. in Education	9
Dani	23	Caucasian	B.A. in Psychology	0

Student Participants

From the students identified as meeting the criteria for inclusion in this study, each teacher participant chose 1 student that they felt would benefit the most from a self-monitoring intervention and had the greater need to increase appropriate classroom behavior. Thus, there were a total of eight participants: 4 teachers and 4 students. Teachers were asked to complete the Vineland Adaptive Behavior Scales, Second Edition, Teacher Rating Form (Vineland-II TRF; Sparrow, Cicchetti, & Balla, 2006) for their student prior to the baseline phase of this study, and teachers returned the completed forms during baseline. All teachers returned the Vineland-II TRF prior to beginning self-monitoring training with their student.

All student participants had been diagnosed with autism by an independent evaluator using the DSM-IV TR criteria, were five years old, and communicated with single words or phrases. A summary of student participants appears in Table 5. Each teacher and student participant and classroom setting are described below in the order in which the intervention was introduced following the multiple probe design.

Table 5. Student participant information.

Student's Name	Age (years, months)	Race/ Ethnicity	Diagnosis	Mode of Communication
Isaac	5 y 1 m	Caucasian	Autism	Single words and phrases; often requires adult prompting
Davis	5 y 4 m	Caucasian	Autism	Gestures; DynaVox V™; single words and phrases with adult prompting
John	5 y 6 m	Caucasian	Autism	Single words and phrases
Madison	5 y 11 m	Caucasian	Autism	Single words and phrases; often requires adult prompting

Teacher/Student Dyads

Beatriz/Isaac

Beatriz. The first participant teacher was Beatriz, a 34-year-old female Hispanic and Caucasian teacher with 7 years of experience teaching general education and her first year teaching special education. Beatriz had a Masters in Education, an EC-4 certification, and was a third year doctoral student in an educational leadership program specializing in K-12. Beatriz's classroom consisted of 6 students age 4 and 5 years, and Beatriz had one supporting teacher in the classroom assisting her. This classroom had a higher teacher to student ratio than the other classrooms at the school because the goal of this classroom was to prepare students for typical Kindergarten or first grade classroom. One of the ways in which this was done was by increasing the teacher to student ratio to have the students practice sharing teacher attention. Beatriz chose to create a self-monitoring intervention for Isaac to use during Circle Time. The researcher selected Table Activity as the generalization activity.

Circle Time was a 14-30 minute activity where the students sat in a chair or on the floor in a semi circle away from the table. All 6 students, one teacher, and one supporting teacher were present. The students sang songs, said the pledge of allegiance, talked about the date, counted, discussed the weather, learned about various types of clothes (e.g., short leaves, long sleeves, shorts, pants), learned their own and each other's birthdays, and worked on patterns. The generalization activity was Table Activity. All 6 students, one teacher, and one supporting teacher were present. Table Activity was a 15-25 minute activity during which the students sat in a chair around a kidney-shaped table facing the

teacher. The students learned about letter sounds, spelling, feelings, and how to ask and share information with their classmates.

Isaac. Isaac was a 5-year 1-month old Caucasian boy with autism. He communicated using single words and phrases but needed to be prompted to do so. Isaac would become easily frustrated when things did not go his way and would scream, stomp his feet, and leave the classroom before attempting to communicate using his vocal language if not prompted by an adult. This was Isaac's first year at the school. Prior to this setting, he attended a Preschool Program for Children with Disabilities (PPCD) classroom in public school. Isaac's challenges at school revolved around the social aspects of learning including taking turns, sharing adult attention, and following teacher instruction. During 1-to-1 instruction, Isaac performed at or above grade level on academic tasks.

Beatriz completed the Vineland-II TRF when Isaac was 5-years 2-months. Isaac scored below average on the adaptive behavior composite score as indicated by his percentile rank of 14. As far as adaptive level, most of Isaac's scores were in the moderately low range with a few in the adequate and low range. The age equivalent scores ranged from 3-years 0-months to 7-years 3-months, with the majority of scores falling in the 3-year old age equivalent. See Table 6 for a summary of Isaac's percentile rank, adaptive level, and age equivalent by domain and subdomain.

Comparison within domains and across domains indicate that Isaac's strengths were in communication, specifically written communication, and motor skills as compared to socialization and daily living, though his academic skills fell in the adequate range. See Table 7 for a list of Isaac's domain and subdomain comparisons and frequency

of the differences on the Vineland-II TRF that were statistically significant. His scores on the Vineland-II TRF indicate significant impairment in age-appropriate communication and personal functioning.

Table 6. Isaac's adaptive level and age equivalent scored by subdomain on the Vineland-II TRF.

Domain	Subdomain	Percentile Rank	Adaptive Level	Age Equivalent (years, months)
Adaptive Behavior Composite		14	Moderately low	
Communication		42	Adequate	
	Receptive		Moderately low	3 y 0 m
	Expressive		Low	< 3 y 0 m
	Written		High	7 y 3 m
Daily Living Skills		12	Moderately low	
	Personal		Low	< 3 y 0 m
	Academic		Adequate	5 y 7 m
	School Community		Moderately low	3 y 8 m
Socialization		4	Moderately low	
	Interpersonal Relationships		Moderately low	< 3 y 0 m
	Play and Leisure Time		Moderately low	< 3 y 0 m
	Coping Skills		Moderately low	< 3 y 0 m
Motor Skills		27	Adequate	
	Gross		Moderately low	3 y 3 m
	Fine		Adequate	5 y 2 m

Anna/Davis

Anna. The second participant teacher was Anna, a 31 year-old female Caucasian teacher with a M.Ed. in Special Education specializing in autism and developmental disabilities. She had completed the coursework required to become a BCBA and was completing her practicum hours. This was Anna ’s first year teaching children with disabilities in a classroom setting. Anna ’s previous experience was working with adults with disabilities for 3.5 years in a group home. She had also been working with children

Table 7. Isaac's statistically significant domain and subdomain comparisons and frequency of difference for the Vineland-II TRF.

Domain Comparisons	Frequency of Difference
Communication Skills > Daily Living Skills	16%
Communication Skills > Socialization Skills	10%
Motor Skills > Socialization Skills	Not unusual
Communication Comparisons	**Frequency of Difference**
Written > Expressive	Not unusual
Written > Receptive	1%
Daily Living Skills Comparisons	**Frequency of Difference**
Academic > Personal	1%
Academic > School Community	Not unusual
*School Community > Personal	16%
Across Domains Comparisons	**Frequency of Difference**
Fine Motor Skills > Personal Skills	1%
Written Communication > Expressive Communication	1%
Written Communication > Fine Motor	1%
Written Communication > Receptive Communication	1%

Note. All differences were significant at the .01 level except for the item denoted by a "*" where the difference was significant at the .05 level.

with disabilities as an in-home applied behavior analysis (ABA) therapist for 1 year. Anna ’s classroom consisted of 4 students age 4 to 6 years, and Anna had one supporting teacher in the classroom assisting her. Anna chose to create a self-monitoring system for Davis to use during Morning Routine. Morning Routine was a 10-18 minute activity where the students took turns going to the bathroom and setting up their daily schedule. Anna and her supporting teacher assisted students individually during these two activities. While the teachers assisted students, the other students were expected to sit around a circular table and play with toys.

Davis. Davis was a 5-year 4-month old boy with autism. To communicate, Davis used a few vocalizations and gestures, but mostly communicated through the use of an

augmentative and assistive communication device, the DynaVox V™ with adult prompting needed to initiate the use of the DynaVox V™. This was Davis' third year at the school. Davis had difficulties staying on task and would often stand up and spin during instruction and play time. Davis would sometimes go back to his chair when his teachers asked him to do so, though he required physical prompting most of the time. He had difficulty learning academic tasks and was below grade level in all areas. The Vineland-II TRF was completed by Anna when Davis was 5-years 4-months. Davis scored low on the adaptive behavior composite score as indicated by his percentile rank of less than 1. His scores do not suggest personal strengths or weaknesses, as all domain areas were relatively equal. Davis' scores all fell in the low to moderately low range, with the majority being classified in the low range of adaptive behavior and an age equivalent of 3-years 0-months. See Table 8 for a summary of Davis' percentile rank, adaptive level, and age equivalent by domain and subdomain. Davis' scores on the Vineland-II TRF indicate significant impairment in age-appropriate communication and personal functioning.

Lizette/John

Lizette. The third participant was Lizette, a 30-year-old female Caucasian teacher who had been teaching special education for nine years. She had a B.A. in Education and was certified in special education EC-12. Lizette's classroom consisted of 6 students age 5 to 7 years, and Lizette had two supporting teacher in the classroom assisting her. The goal of this classroom was also to prepare students for typical Kindergarten or first grade classroom. This class required a 2 to 1 student to teacher ratio because three of the students in the classroom exhibited severe challenging behavior at times. Lizette chose to

create a self-monitoring intervention for John to use during Math. The researcher selected Reading as the generalization activity.

Table 8. Davis' percentile rank, adaptive level, and age equivalent scored by subdomain on the Vineland-II TRF.

Domain	Subdomain	Percentile Rank	Adaptive Level	Age Equivalent (years, months)
Adaptive Behavior Composite		< 1	Low	
Communication		1	Low	
	Receptive		Low	< 3 y 0 m
	Expressive		Low	< 3 y 0 m
	Written		Moderately low	4 y 0 m
Daily Living Skills		1	Low	
	Personal		Low	< 3 y 0 m
	Academic		Low	< 3 y 0 m
	School Community		Moderately low	< 3 y 0 m
Socialization		3	Moderately low	
	Interpersonal Relationships		Moderately low	< 3 y 0 m
	Play and Leisure Time		Low	< 3 y 0 m
	Coping Skills		Moderately low	< 3 y 0 m
Motor Skills		< 1	Low	
	Gross		Moderately low	< 3 y 0 m
	Fine		Low	< 3 y 0 m

Math was a 15-30 minute activity where the students sat around a kidney-shaped table. There were 4-5 students present during this activity, the teacher, and sometimes one supporting teacher. One of the students had individual ABA therapy during this time and the other was working on increasing the time during which he was able to join the class during academic activities with low rates of challenging behavior. Students learned various math concepts including rote and skip counting, adding, and telling time.

The generalization activity, Reading, was a 15-30 minute activity where the students sat at their individual desks and faced the teacher who was standing in the front

of the room for about half of the time and then moved to sit around a kidney-shaped table for the remaining time. There were 4-5 students present during this activity, the teacher, and sometimes one supporting teacher. One of the students had individual ABA therapy during this time and the other was working on increasing the time during which he was able to join the class during academic activities with low rates of challenging behavior. Students learned various concepts including letter sounds, beginning sounds, ending sounds, book skills (e.g., turning the page, following along with pointer finger), parts of a book (e.g., front cover, spine), and reading comprehension.

John. John was a 5-year 6-month old Caucasian boy with autism. He communicated using short sentences. When an adult or peer spoke to him, he was often not attending and the adult or peer needed to repeat their question/statement or use another prompt, such as getting closer or tapping him on his shoulder, to gain his attention. John seldom initiated interactions with his peers but would initiate interactions with adults.

John entered the school 5 months before the end of the previous school year. Prior to attending this setting, John attended a PPCD classroom in public school. John was not one of the students who displayed severe challenging behavior. He would, however, cry loudly and push other students to escape group instruction. John was sometimes removed from the classroom because he was so loud that the other student's in the class could not hear the teacher or attend to the activity. When John was able to remain in academic instruction, he had difficulty sitting in his chair and would play with classroom materials and his hands. For example, he pretended that his hands were airplanes and hand

mouthed. John's preferred activity was play, and he did not need adult direction to play alone with toys. He did, however, need adult direction to engage in appropriate play with his peers.

Lizette completed the Vineland-II TRF when John was 5-years 9-months. John scored moderately low on the adaptive behavior composite score as indicated by his percentile rank of 3. Most of John's scores fell in the moderately low range with a few scores falling in the low and adequate range. His age equivalent scores ranged from 3-years 0-months to 5-years 9-months. See Table 9 for a summary of John's percentile rank, adaptive level, and age equivalent by domain and subdomain.

Table 9. John's pecentile rank, adaptive level, and age equivalent scored by subdomain on the Vineland-II TRF.

Domain	Subdomain	Percentile Rank	Adaptive Level	Age Equivalent (years, months)
Adaptive Behavior Composite		3	Moderately low	
Communication		9	Moderately low	
	Receptive		Moderately low	< 3 y 0 m
	Expressive		Moderately low	< 3 y 0 m
	Written		Adequate	5 y 9 m
Daily Living Skills		4	Moderately low	
	Personal		Low	< 3 y 0 m
	Academic		Adequate	5 y 4 m
	School Community		Moderately low	3 y 10 m
Socialization		10	Moderately low	
	Interpersonal Relationships		Moderately low	< 3 y 0 m
	Play and Leisure Time		Adequate	4 y 0 m
	Coping Skills		Moderately low	< 3 y 0 m
Motor Skills		1	Low	
	Gross		Low	< 3 y 0 m
	Fine		Moderately low	3 y 10 m

Comparisons within domains and across domains indicated that John's motor skills were a weakness and significantly lower than his communication and socialization

skills. John's written communication was significantly higher than his receptive and expressive communication and fine motor skills. See Table 10 for a list of John' domain and subdomain differences on the Vineland-II TRF that were statistically significant.

Table 10. John's statistically significant domain and subdomain comparisons and frequency of difference for the Vineland-II TRF.

Domain Comparisons	Frequency of Difference
*Communication > Motor Skills	Not unusual
Socialization > Motor Skills	Not unusual
Communication Comparisons	**Frequency of Difference**
Written > Expressive	10%
Written > Receptive	16%
Daily Living Skills Comparisons	**Frequency of Difference**
Academic > Personal	10%
Across Domains Comparisons	**Frequency of Difference**
Written Communication > Expressive Communication	10%
Written Communication > Fine Motor	10%
Written Communication > Receptive Communication	16%

Note. All differences were significant at the .01 level except for the item denoted by a "*" where the difference was significant at the .05 level.

Dani/Madison

Dani. The fourth participant teacher was Dani, a 23-year old female Caucasian first year teacher with a Bachelor's in Psychology. Prior to working at the school, Dani worked as an ABA therapist at a center for one year. Dani's classroom consisted of 4 students age 4-5 years, and Dani had one supporting teacher assisting her. Dani chose to develop a self-monitoring intervention for Madison to use during Journal. Journal lasted between 10-18 minutes and consisted of all 4 students sitting around a circular table writing their name, date, and activities they participated in throughout the day. Dani assisted each student individually to complete his/her journal. While she helped one

student, her supporting teacher took another student to the bathroom, and the other students were expected to sit in their chairs and read a book or play with toys.

Madison. Madison was a 5-year 11-month old Caucasian girl with autism. Madison communicating using single words and phrases but needed to be prompted to do so. Madison rarely initiated peer interactions and when she did it was physical in nature and somewhat inappropriate (e.g., playfully pushing a friend). This was Madison's first year at the school. Prior to being at the school, she attended another private school. Madison's behavior was inconsistent. On some days, Madison had no difficulty following teacher directions and participating in classroom activities when provided the appropriate support. Other days, however, Madison had a very hard time in the classroom. She would cry and lie on the floor sometimes for prolonged periods of time. This inconsistency in Madison's behavior was one of Dani's major concerns.

Madison was aged 6-years 4-months when the Vineland-II TRF was completed by Dani. Madison's Adaptive Behavior Composite percentile rank was 1 as were all percentiles in each area assessed. Madison scored low to below average on all areas. Madison's scores do not suggest personal strengths or weaknesses, as all domain areas were relatively equal. See Table 11 for a summary of Madison's percentile rank, adaptive level, and age equivalent by domain and subdomain. Her scores on the Vineland-II TRF indicate significant impairment in age-appropriate communication and personal functioning.

Table 11. Madison's percentile rank, adaptive level, and age equivalent scored by subdomain on the Vineland-II TRF.

Domain	Subdomain	Percentile Rank	Adaptive Level	Age Equivalent (years, months)
Adaptive Behavior Composite		< 1	Low	
Communication		< 1	Low	
	Receptive		Low	< 3 y 0 m
	Expressive		Low	< 3 y 0 m
	Written		Low	4 y 3 m
Daily Living Skills		< 1	Low	
	Personal		Moderately low	3 y 5 m
	Academic		Low	3 y 6 m
	School Community		Low	< 3 y 0 m
Socialization		< 1	Low	
	Interpersonal Relationships		Low	< 3 y 0 m
	Play and Leisure Time		Low	< 3 y 0 m
	Coping Skills		Low	< 3 y 0 m
Motor Skills		1	Low	
	Gross		Moderately low	3 y 9 m
	Fine		Low	< 3 y 0 m

Operational Definitions of Target Behaviors

There were two sets of dependent variables in this study, one set for teacher behavior and one set for student behavior. This section first discusses the teacher behaviors, which included the amount of time that the self-monitoring material was available, prompts to engage in the target behavior, prompts to self-monitor, and adherence to the consequence schedule. Student behaviors, which included sitting appropriately, engagement in self-monitoring behavior, and independently self-monitoring, are then presented.

Teacher Behaviors

Amount of Time that the Self-Monitoring Material was Available

One dependent variable for teacher behavior was the amount of time that self-monitoring material was made available to the target student. The operational definition of available self-monitoring material was that self-monitoring material (i.e., clipboard, board, three-dimensional chart) was within arm's reach of the student with no more than a 10-second interruption. This dependent variable was measured by starting the stopwatch when the self-monitoring material was made available to the student during the specific class period. Time on the stopwatch was stopped when the material was no longer available to the student or if the class period ended. Less than a 10-second interruption was allowed to give teacher's time to bring the self-monitoring system within the participant's reach if the student's self-monitoring system fell or was thrown. Sessions lasted the length of the class period, which corresponded to 14-30 minutes for Isaac, 10-18 minutes for Davis, 20-30 minutes for John, and 10-18 minutes for Madison. Percentage of time that the self-monitoring material was available was calculated by dividing the amount of time that the self-monitoring material was available by the length of the self-monitoring session and multiplying by 100.

Prompts to Engage in the Target Behavior

Another dependent variable for teacher behavior was the number of prompts the teacher gave to the student to engage in the target behavior or not to engage in a competing behavior. The operational definition of teacher prompt to engage in the target behavior was any single or series of vocal (e.g., "you need to sit down") or non-vocal

(e.g., pointing to a picture of a child sitting in his/her chair) reminders, with less than a 3-second pause between reminders, for the student to engage in the target behavior (e.g., sit in chair) or not engage in a competing behavior (e.g., stand up). This dependent variable was measured by a frequency count of reminders. The total number of reminders was divided by the length of the session to calculate a rate (i.e., number of teacher prompts to engage in the target behavior per minute) that enabled a comparison across sessions of different lengths (e.g., 15 min vs. 30 min).

Prompts to Self-Monitor

Data on teachers' prompts to use the self-monitoring material were also collected. The operational definition of teacher prompt to self-monitor was any single or series of vocal (e.g., "you need to check your timer") or non-vocal (e.g., pointing to the self-monitoring material) reminders for the student to self-monitor. Prompts were counted per self-monitoring instance. Thus, each opportunity to self-monitor only had zero or one prompts to self-monitor regardless of the number of prompts required for the student to self-monitor. For example, a score of 1 prompt to self-monitor was given when the teacher gave one pointing prompt to self-monitor. If the teacher gave a pointing prompt, followed by a verbal prompt, followed by a physical prompt, this was also counted as 1 prompt to self-monitor. This dependent variable was measured by a frequency count of prompts. The total number of prompts to self-monitor was divided by the length of the session to calculate a rate (i.e., number of teacher prompts to self-monitor per minute).

Adherence to the Consequence Schedule

Data were collected on teachers' adherence to the consequence schedule (i.e., whether they provided reinforcement based on the contingency). The operational definition for adherence to the consequence schedule was individualized to fit each contingency. For Beatriz it was defined as Beatriz provides Isaac with a sticker at the end of the activity if he sits inappropriately ___ or fewer times as stated at the beginning of the session. If Isaac does not sit appropriately for ___ or fewer times as stated at the beginning of the session, Beatriz does not provide a sticker and provides Isaac with feedback (e.g., "you do not get a sticker because you got up more than 10 times").

For Anna, adherence to the consequence schedule was defined as Anna provides Davis with 1 edible reinforcer and verbal praise (e.g., "Good job! You were sitting in your chair the entire time!") if he sits appropriately for the entire interval. If Davis does not sit appropriately during the entire interval, Anna does not provide an edible reinforcer and provides feedback (e.g., "you do not get a candy because you were not sitting in your chair").

For Lizette, the initial definition of adherence to the consequence schedule was, Lizette allows John to play after he sits appropriately for ____ 1-minute intervals as stated at the beginning of the session. If John does not sitting appropriately for ___ 1-minute intervals as stated at the beginning of the session, Lizette does not allow him to play and provides feedback (e.g., "you do not get to play because you were not sitting in chair ___ times"). When John was allowed access to the reinforcer after the end of the activity, the definition was changed to Lizette allows John to play at the end of the

activity if John sits appropriately for _____ or more 1-minute intervals as stated at the beginning of the session. If John was not sitting appropriately for ____ or more 1-minute intervals as stated at the beginning of the session, Lizette does not allow him to play and provides feedback (e.g., "you do not get to play because you were not sitting in chair ___ or more times").

For Dani, adherence to the consequence schedule was defined as Dani gives Madison a high five and verbal praise (e.g., "You sat in your chair the entire time!") at the end of the activity if Madison was sitting appropriately during the entire activity. If Madison was not sitting appropriate the entire activity, Dani does not give her a high five and provides her with feedback (e.g., "you were not sitting in your chair the entire time").

Adherence to the consequence schedule was either 0% or 100% for Isaac, John, and Dani since they only received the reinforcer at the end of the activity. Since Davis received his reinforcer after every 1-minute interval, percentage of adherence to the consequence schedule was calculated by dividing the number of times that the teachers adhered to the consequence schedule by the total number of times Davis self-monitored.

Student Behaviors

Sitting Appropriately

Teachers chose the target behavior for each student participant. All teachers chose sitting appropriately as the target behavior, but the operational definition varied for each student depending on each student's needs. Isaac had difficulty sitting in his chair with both feet on the floor, would sometimes stomp his feet when upset, and would get up from his chair without asking for permission. As such, the operational definition was

Isaac sits in his chair with his bottom touching the seat of the chair, all legs of chair completely touching the floor, both feet flat on the floor with no more than two continuous strums of feet on the floor (e.g., no stomping), and keeping his body to himself (e.g., not touching or leaning on other people). If his teacher gave him permission to be out of his chair, this was not counted as inappropriate sitting.

Davis had difficulty staying in his chair and would get up and spin. Anna reported that when he was in his chair, he would sit appropriately most of the time. Thus, sitting appropriately was defined as Davis sits in his chair with his bottom touching the seat of the chair and both feet flat on the floor.

At first, John's teacher chose to target appropriate sitting during Circle Time. However, during baseline, the OT recommended a different chair be utilized for John to help him sit appropriately. The chair that was used was called the "silly chair", and it consisted of a flat piece of wood, approximately 7 in. by 9 in., with one leg in the middle. John had to balance himself and use the table for support. This intervention was effective at getting John to stay in his chair for a couple of weeks. As a result, John's teacher decided that she no longer wanted to utilize a self-monitoring intervention for sitting since John was sitting appropriately in the silly chair. She chose to target raising his hand in order to participate during Math. After a couple of weeks of taking baseline data for raising his hand during Math, John began to have trouble sitting again. His teacher reported that he would often get up from the silly chair and toss it across the room. John was able to easily throw the silly chair a good distance since it was small and light. At this point, his teacher stated that sitting in his chair was a higher priority that raising his

hand since John's inappropriate sitting was disruptive to his learning and that of the other students, and wanted to target appropriate sitting with the self-monitoring intervention. This time, she chose Math because she felt it was more important for him to sit appropriately during academic instruction. Thus, the data reported in this study are John's inappropriate sitting during Math. John had difficulty staying seated as well as keeping his hands out of his mouth. He also had difficultly appropriately interacting with classroom material (e.g., not playing with classroom material). Most of the time when John inappropriately interacted with classroom material, he moved it in front or next to his face as he looked at it. Thus, the operational definition of appropriate sitting was John sits in his chair with his bottom touching the seat of the chair, both feet flat on the floor, and forearms and/or hands touching the table with less than a 5-second interruption. If John got up or reached to get necessary class material or to participate in class, this was not counted as inappropriate sitting. If John was playing with class material, this was counted as inappropriate sitting.

Madison would sometimes sit with her legs hanging from one side of her cube chair, on the arms of the chair, and would lean her chair back. In addition, Madison occasionally became upset and laid on the floor kicking and screaming for prolonged periods of time. Thus, the operational definition was Madison sits in her chair with her bottom touching the seat of the chair, both feet flat on the floor, and all legs of chair touching the floor.

For Isaac, John, and Dani, rate of inappropriate sitting was calculated by dividing the total number of times that the student sat inappropriate by the length of the session.

For Davis, rate of inappropriate sitting was calculated by dividing the total number of 1-minute intervals during which Davis was not sitting appropriately by the total number of 1-minute intervals for each session.

Engagement in Self-Monitoring Behavior

The other dependent variable for student behavior was engagement in self-monitoring behavior. Engagement in self-monitoring behavior was measured by recording whether a student self-monitored using the materials provided. For Isaac and Madison, engagement in self-monitoring behavior was defined as Isaac/Madison makes an "x" on the square every time he/she was not sitting appropriately. For Davis, the operational definition for engagement in self-monitoring behavior was defined as Davis pushes the timer twice when it beeps and puts a green happy face or a red X on a picture of a chair. For John, engagement in self-monitoring behavior was defined as John pushes the timer twice when it beeps and makes a line through a number on the left side of the paper under the "Yes" column or on the right side of the paper under the "No" column.

For Isaac and Dani, percentage of engagement in self-monitoring behavior was calculated by dividing the number of times that the student made an "x" on the square when he/she was not sitting appropriately by the number of times he/she sat inappropriately and multiplied by 100. For Davis, percentage of engagement in self-monitoring behavior was calculated by dividing the number of times that Davis pushed the timer twice when it beeped and put a green happy face or a red X on a picture of a chair by the total number of 1-minute intervals measured with the timer during a session and multiplied by 100. For John, engagement in self-monitoring behavior was calculated

by dividing the number of times that John pushed the timer twice when it beeped and made a line through a number on the left side of the paper under the "Yes" column or on the right side of the paper under the "No" column by the total number of 1-minute intervals measured with the timer during a session and multiplied by 100.

Independently Self-Monitoring

Data were taken on whether the student self-monitored independently or with teacher assistance. For Isaac and Madison, independently self-monitoring was defined as Isaac/Madison independently makes an "x" on the square when he/she was not sitting appropriately without teacher prompting. For Davis, independently self-monitoring was defined as Davis independently pushes the timer twice when it beeps and puts a green happy face on a picture of a chair if he was sitting appropriately for the entire interval or a red X on a picture of a chair if he was not sitting appropriately for the entire interval. For John, independently self-monitoring was defined as John pushes the timer twice when it beeps and makes a line through a number on the left side of the paper under the "Yes" column if he was sitting appropriately during the entire interval or on the right side of the paper under the "No" column if he was not sitting appropriately during the entire interval. For all students, independently self-monitoring indicates that the student correctly and independently self-monitored. Percentage of independent self-monitoring was calculated by dividing the number of independent self-monitoring by the number of independent and prompted self-monitoring and multiplying by 100.

Materials

After receiving brief training on self-monitoring (see procedure section below for details), each teacher was asked to develop a self-monitoring system for 1 student. Teachers then met with the researcher to discuss and receive feedback on the self-monitoring system they developed. Self-monitoring interventions were individualized for each participant. Thus, the method and materials for self-monitoring were different for each participant. However, all self-monitoring interventions shared the following five common components. First, all self-monitoring interventions had a target behavior that was operationally defined. Second, there was an assigned classroom activity when the self-monitoring intervention was used. Third, all self-monitoring interventions included a method of recording the target behavior. Methods for recording the target behavior were either cued or non-cued. Cued self-recording consisted of giving participants a signal (e.g., tone, watch, timer) to record their behavior, and non-cued self-recording consisted of asking the participants to record every time they engaged in the target behavior. Fourth, all self-monitoring interventions had a method of data collection (i.e., event recording, whole-interval recording, partial-interval recording, or momentary time sampling). Fifth, self-monitoring interventions included reinforcement. Information on how reinforcement was chosen was noted, and teachers stated the contingency for receiving reinforcement.

Isaac

Initially, Beatriz chose a cued self-monitoring intervention for Isaac. Isaac was to self-monitor every time that a wristwatch would vibrate by making a check under a

"thumbs up" column if he had been appropriately sitting for the entire interval or under the "thumbs down" column if he had not been appropriately sitting for the entire interval. The terms "thumbs up" and "thumbs down" were used because Isaac was familiar with them as Beatriz utilized them throughout the day with all the students. During Isaac's self-monitoring training, Beatriz discovered that the wristwatch was too distracting for Isaac. He giggled intensely every time the watch vibrated and eagerly looked at the countdown of the timer anticipating it to vibrate. Thus, Isaac's self-monitoring system was changed.

Beatriz and the researcher discussed various options. Beatriz did not want to use an audible timer as she felt this would distract the other students. Isaac utilized a paper and pencil self-monitoring system to record every time he was not sitting appropriately. A table with 30 squares and the corresponding numbers in the squares was made and Isaac was to put an "x" on a square every time he was not sitting appropriately. The self-monitoring sheet (see Figure 1) was put on a small clipboard, approximately 4.5 in. by 8 in. A Boardmaker® picture of a stick figure sitting in a chair with the words "sit in chair" at the top and an "X" over the picture and the words was taped to the top of the clipboard. The phrase "no stomping" was also put on the clipboard below the self-monitoring sheet to remind Isaac that sitting appropriately included no stomping. A pencil with a pencil grip that was recommended by the OT for Isaac was attached to the bottom of the clipboard by putting a piece of Velcro® in the middle of the pencil and on the bottom of the clipboard. The clipboard also had a piece of Velcro® on the back and a piece of Velcro® was put on the right arm of Isaac's cube chair to place the clipboard within

reach but not in Isaac's way. See Figure 2 for a picture of Isaac's self-monitoring materials. The written phrase "raise hand before standing" was also added to the clipboard below the self-monitoring sheet 7 days after the intervention was re-introduced.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30

If I get ____ or less,

I will get a sticker.

Figure 1. Isaac's self-monitoring sheet for not sitting in his chair.

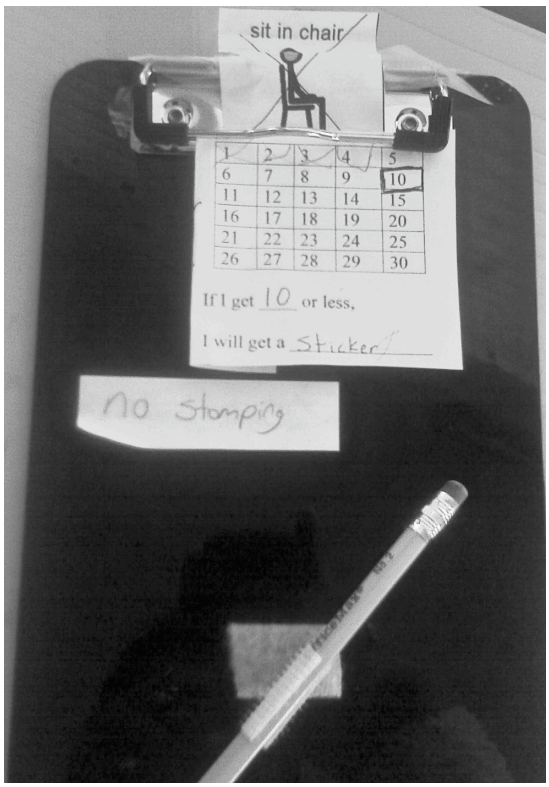


Figure 2. Isaac's self-monitoring system.

Davis

Davis' self-monitoring system was a three-dimensional cued system. The self-monitoring sheet had the words "Did I stay sitting in my chair?" at the top of it. Fifteen squares with a Boardmaker ® picture of a stick figure sitting in a chair and a piece of Velcro® on top of each square appeared below it. Eight green happy faces and eight red "X"s were placed to the right of the 15 squares on two vertically placed strips of Velcro®. The self-monitoring sheet was printed on an 8.5 in. by 11 in. paper, although one section on the bottom left was cut out since it was blank, and laminated. See Figure 3 for a picture of Davis' self-monitoring system.

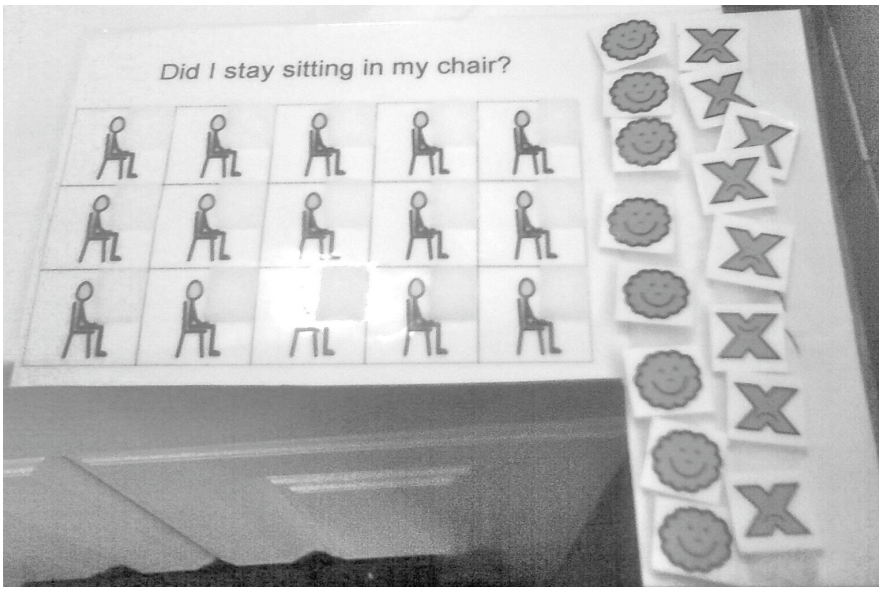


Figure 3. Davis' self-monitoring system.

Davis' self-monitoring sheet was placed on the table to one side so that it would not be in the way yet it would still be accessible. A digital timer made by Classroom Products™ was placed directly in front of Davis so that Davis could easily view it and

turn it off and reset it as needed but was about 2 feet in front of him so that it was not in his way. A piece of Velcro® was put on the bottom of the timer and attached to another piece of Velcro® on the table.

John

John's self-monitoring system consisted of a paper-and-pencil cued system. The components of the self-monitoring system were placed on a clipboard made to fit an 8.5 in. by 11 in. sheet of paper. Velcro® was used to attach the digital timer made by Classroom Products™ to the clip at the top of the clipboard. Below the clip on the left side was a picture of John sitting appropriately and the word "Yes" at the top. Five days after the introduction of the self-monitoring system, the words "bottom down, feet down, hands on desk, head up" were added on the left side of the pictures to remind John how to sit appropriately. On the right side were four pictures depicting four ways in which John sat inappropriately (i.e., head on the table, under the table, elbow on table with head in hand, head in hand with arms not touching the table) and the word "No" at the top. The pictures used on the clipboard were identical to some of the pictures used during John's self-monitoring training. Directly below on the left of the self-monitoring sheet were 20 boxes with the word "Yes" at the top and on the right were 20 boxes with the word "No" at the top. The sentence "If I get ____ or more Yes, I will get to play." appeared directly below. The teacher filled in the blank before each session based on the criteria that John was to stay in his chair for at least half of the intervals. *Figure 4* shows a picture of John's self-monitoring system. The clipboard had a piece of Velcro® on the back and

was placed on a piece of Velcro® on the right side of the table within John's reach but giving him enough room to place and interact with class materials.

Figure 4. John's self-monitoring system.

Madison

Madison utilized a paper and pencil self-monitoring system to record every time she was not sitting appropriately. A piece of laminated paper measuring approximately 4.5 in. by 8 in. was covered with a blue piece of construction paper and used as a board to place the self-monitoring material. Blue was Madison's color in the classroom. On the front of the board was a piece of paper labeled at the top with the phrase "NOT sitting appropriately" and under this phrase were two pictures of Madison not sitting

appropriately (i.e., standing up, one leg over the arm of the chair). Below this was a sheet with ten squares on it. On the back of the board was a picture of Madison sitting appropriately. The pictures used in the self-monitoring system were identical to some of the pictures that were utilized during Madison's self-monitoring training. See Figure 5 for a picture of Madison's self-monitoring system. On the back of Madison's self-monitoring system was also a piece of Velcro® that was used to attach the self-monitoring system to a piece of Velcro® on the right side of the table to make it accessible for her but also give her room to read books or play with toys.

Figure 5. Madison's self-monitoring system; front (left) and back (right).

The Researcher Assisted Teachers in Creating Self-Monitoring Materials

Teachers were not paid to participate in this study. The researcher did not want to provide any additional work for them since teachers are very busy. As such, the

researcher offered to create any materials they needed for the self-monitoring system and/or training. The researcher created the self-monitoring materials for Beatriz, Lizette, and Dani according to each teacher's specifications. The researcher assumed a role similar to a supporting teacher at this time and created the self-monitoring material to the teachers' specifications. After creating it, the researcher checked with the teachers to see if what had been created was what they had in mind. The researcher made any modifications requested by the teachers.

For Beatriz, the researcher created Andrew's self-monitoring sheets (Figures 1, 10, and 12) and Beatriz purchased the small clipboard. The researcher offered to purchase a clipboard for Beatriz, but she said that she didn't mind doing it. The researcher offered to create and/or purchase any material for Anna, but she said that she could do it herself, and that it was not necessary for the researcher to do the work. For Lizette, the teacher created John's self-monitoring sheet (Figure 4) and provided the clipboard to hold all self-monitoring materials in place. The researcher purchased the clipboard and a timer for the teacher since she did not have one in her classroom that she could utilize for the self-monitoring intervention. The researcher did not want to ask Lizette to take time away from her own time to go to the store and purchase a clipboard and timer. The researcher also assisted Lizette in taking pictures of John sitting appropriately and not sitting appropriately. The researcher printed the pictures after asking Lizette what size she wanted them. The researcher also added the pictures of John sitting and not sitting appropriately to the top of the self-monitoring clipboard per Lizette's request.

The researcher created Madison's self-monitoring system (Figure 5) and covered a thick piece of cardboard with blue construction paper and put a large clip at the top to hold all of Madison's self-monitoring material. The researcher also assisted Dani in taking pictures of Madison sitting appropriately and not sitting appropriately. The researcher printed the pictures after asking Dani what size she wanted them. The researcher also added the Boardmaker® pictures of sitting and not sitting appropriately to the top of the self-monitoring clipboard per Dani's request and a large picture of Madison sitting to the back of the self-monitoring board.

Data Collection

Data for this study were collected over the course of 7 months (i.e., October 15, 2008-May 15, 2009). Data on both the teachers' and the students' behavior were collected. The operational definitions of target behaviors guided data collection. Data were collected during two classroom activities, one activity selected by the teacher and one selected by the researcher to assess generalization. During baseline, data in the training activities were collected about every third day, and in the generalization activity data were collected once a week. During the intervention phase, the self-monitoring intervention was implemented every day, and data were collected every day in the training context. During the maintenance phase, data were initially collected every day, and then were collected from one to five times per week in both the training and generalization activities.

Baseline

This study intended to have teachers serve as the primary data collectors. However, this had to be revised to accommodate for what teachers reported they could accurately do in their classroom. Baseline data were collected before teachers were given the self-monitoring training. Prior to self-monitoring training, the researcher consulted with the teachers to develop an operational definition of the target behavior and instructed them on data collection. All teachers were asked to take baseline data on the number of times that their students were not sitting appropriately. The researcher provided data sheets and counters made by Sportline® to all teachers to assist them with data collection.

Initially, event recording was used to record inappropriate sitting for all students. Beatriz asked to have her supporting teacher collect the data. Thus, the researcher also met with Beatriz's supporting teacher to train her on data collection. It took 3 days to finalize the operational definition for Isaac, and data are reported after the operational definition was defined. See Appendix B for a sample of Isaac's baseline data sheet.

Anna took baseline data for Davis. There were only 4 students in Davis' classroom and when 2 students were absent, Davis' rate of inappropriate sitting decreased. Thus, data were included only for days when there were 3 or 4 students in his classroom. After several weeks of collecting data with event recording on Davis, a partial-interval system of data collection of inappropriate sitting (i.e., Did Davis sit inappropriately at any time during the interval?) was used instead of event recording for two reasons. First, Davis sometimes stood up for a long period of time before sitting

down. Thus, event recording data was underestimating his behavior. In addition, Anna wanted to utilize an interval system for Davis' self-monitoring system. The researcher went back and coded previous baseline session data for Davis using the partial-interval recording system. Two baseline data points were lost since these sessions had not been videotaped. See Appendix C for a sample of Davis' baseline data sheet.

The researcher collected the data for Lizette at the teacher's request. During Math time, Lizette only had one supporting teacher in the classroom, and at times that person was not in the room. Thus, she thought it would be very difficult for her to collect data while leading class especially given the length of the activity and the complexity of the operational definition of John's behavior. See Appendix D for a sample of John's baseline data sheet. Dani took baseline data for Madison. See Appendix E for a sample of Madison's baseline data sheet. In summary, the primary data collector for rate of inappropriate sitting during baseline was the supporting teacher for Isaac, the teacher for Madison, and the researcher for Davis and John.

Intervention and Maintenance

During intervention and maintenance, primary data for students' inappropriate sitting was collected by Beatriz's supporting teacher, Anna's supporting teacher, Dani, and the researcher for John. The researcher met with teachers and supporting teachers to instruct them on data collection methods for the intervention phase of this study. The researcher collected the primary data for Lizette at the teacher's request.

Data for engagement in self-monitoring behavior, independent self-monitoring, and for teacher behavior (i.e., the amount of time that self-monitoring material was

available to the target student, teacher prompts to engage in the target behavior, teacher prompts to self-monitor, and adherence to the consequence schedule) were collected by Anna's supporting teacher and Dani. Beatriz's supporting teacher attempted to collect data on all the behaviors but found that she was unable to accurately do so given other demands in the classroom. Lizette informed the researcher that she would be able to accurately report these other variable. As such, the researcher collected the data for Beatriz/Isaac and Lizette/John.

See Appendix F for a sample teacher intervention and maintenance data sheet for Isaac. For a sample teacher intervention data sheet for Davis see Appendix G and for Madison see Appendix I. See Appendix H for a sample intervention data sheet for John.

Interobserver Agreement

Interobserver agreement was calculated using an exact agreement approach. If both the teacher and the researcher recorded the same response, the trial was counted as an agreement. When the teacher and the researcher recorded different responses, the trial was counted as a disagreement. Interobserver agreement was calculated by using an exact agreement approach in which the total number of agreements was divided by the total number of agreements plus disagreements and multiplied by 100. If interobserver agreement fell below 80% for two consecutive sessions, the teachers received additional training on data collection.

For target behavior in which the teacher served as the primary data collector, most of the interobserver agreement data were collected by the researcher in vivo. When the researcher was not present, interobserver agreement data were collected by viewing a

videotape of the session. Most sessions were videotaped. For target behaviors in which the researcher served as the primary data collector, including teacher and student behaviors for some participants within the training activity and all teacher and student behavior within the generalization activity, interobserver agreement were calculated by viewing a videotape of the sessions.

See Appendix J for a sample interobserver agreement baseline data sheet and Appendix K for a sample interobserver agreement intervention and maintenance data sheet for Isaac. For Davis, the same data sheet that was used to take the primary data during baseline was used for interobserver agreement data. See Appendix M for a sample interobserver agreement intervention data sheet for Davis. For John, the same data sheets that were used to take the primary data during baseline and intervention were used to take interobserver agreement data. See Appendix L for a sample interobserver agreement baseline data sheet and Appendix N for a sample interobserver agreement intervention data sheet for Madison.

Interobserver agreement for teacher and student behavior in which the teacher served as the primary data collector was conducted for an average of 89.6% (range 79-100%) of sessions and averaged 98.4% (range 93.7-100%). Data for teacher prompts to self-monitor and students' independent self-monitoring was calculated from the same data point because data were taken on whether or not the student self-monitored. If the student self-monitored but did not self-monitor independently, this meant that the teacher prompted the student to self-monitor.

The percentage of sessions in which interobserver agreement was recorded was higher than what is typically used in the literature to evaluate the accuracy of data, given that the teachers were often recording the primary data. Interobserver agreement for teacher and student behavior in which the researcher served as the primary data collector was conducted for an average of 43.5% (range 33.3-66.7%) of sessions and averaged 97% (range 94.2-100%). See Table 12 for percentage of sessions for which interobserver agreement was coded and interobserver agreement scores and range for each teacher participant. See Table 13 for percentage of sessions for which interobserver agreement was coded and interobserver agreement scores and range for each student participant.

In the generalization activity, interobserver agreement for Beatriz and Isaac's target behaviors was conducted for an average of 44.5% (range 44-45%) of sessions and averaged 99.2% (range 97.4-100%). Interobserver agreement for Lizette and John's target behaviors in the generalization activity was conducted for an average of 48% (range 43-50%) of sessions and averaged 98.9% (range 96.6-100%). See Table 14 for generalization activity interobserver agreement for teacher and student behaviors for Beatriz/Isaac and Lizette/John. Data are reported for Beatriz/Isaac and Lizette/John since they used the self-monitoring system in the generalization activity.

Treatment Fidelity

Treatment fidelity data was taken during sessions. Two points were awarded for each of the following behaviors: providing the student with the self-monitoring system, prompting the student only when required, and adhering to the consequence schedule. A

Table 12. Primary data collector and interobserver agreement (IOA) data for teacher behaviors.

Teacher Participant		Amount of Time that Self-Monitoring Material was Available	Prompts to Engage in the Target Behavior	Prompts to Self-Monitor	Adherence to the Consequence Schedule
Beatriz	Primary Data Collector	Researcher	Researcher	Researcher	Researcher
	% of Sessions with IOA	44.4%	38.1%	38.1%	33.3%
	Average IOA	100%	97.4%	98.8%	100%
	Range		50-100%	83-100%	
Anna	Primary Data Collector	Supporting teacher	Supporting teacher	Supporting teacher	Supporting teacher
	% of sessions with IOA	83%	79%	83%	83%
	Average IOA	100%	96.10%	99.6%	98.7%
	Range		57-100%	80-100%	75-100%
Lizette	Primary Data Collector	Researcher	Researcher	Researcher	Researcher
	% of Sessions with IOA	37.5%	41.7%	37.5%	37.5%
	Average IOA	100%	94%	97.1%	100%
	Range		63-100%	80-100%	
Dani	Primary Data collector	Teacher	Teacher	Teacher	Teacher
	% of Sessions with IOA	100%	94.3%	95.7%	100%
	Average IOA	100%	97.4%	100%	100%
	Range		75-100%		

Table 13. Primary data collector and interobserver agreement (IOA) data for student behaviors.

Teacher Participant		Sitting Appropriately -Baseline	Sitting Appropriately - Intervention and Maintenance	Engagement in Self-Monitoring Behavior	Independently Self-Monitoring
Isaac	Primary Data Collector	Supporting teacher	Supporting teacher	Researcher	Researcher
	% of Sessions with IOA	94%	87%	62.2%	38.1%
	Average IOA	93.7%	94.2%	98.8%	98.8%
	Range	75-100%	50-100%	83-100%	83-100%
Davis	Primary Data Collector	Researcher	Supporting teacher	Supporting teacher	Supporting teacher
	% of sessions with IOA	33.3%	78.7%	83%	83%
	Average IOA	100%	99.6%	98.3%	99.6%
	Range		86-100%	83-100%	80-100%
John	Primary Data Collector	Researcher	Researcher	Researcher	Researcher
	% of Sessions with IOA	66.7%	41.7%	37.5%	37.5%
	Average IOA	92.9%	92.6%	95.9%	97.1%
	Range	76-100%	80-100%	80-100%	80-100%
Madison	Primary Data collector	Teacher	Teacher	Teacher	Teacher
	% of Sessions with IOA	% of Sessions with IOA	95.7%	91.7%	95.7%
	Average IOA	Average IOA	100%	100%	100%
	Range	Range			

Table 14. Generalization activity interobserver agreement (IOA) data for teacher and student behaviors for Beatriz/Isaac and Lizette/John.

Participant Behaviors	Target Behavior	Beatriz/Isaac			Lizette/John		
		% of sessions with IOA	Average IOA	Range	% of sessions with IOA	Average IOA	Range
Teacher Behaviors	Amount of Time that Self-Monitoring Material was Available	44%	100%		50%	100%	
	Prompts to Engage in the Target Behavior	45%	97.8%	80-100%	45%	96.6%	83-100%
	Prompts to Self-Monitor	44%	100%		50%	100%	
	Adherence to the Consequence Schedule	45%	100%		50%	100%	
Student Behaviors	Sitting Appropriately-Baseline	45%	97.4%	88-100%	43%	96.7%	90-100%
	Sitting Appropriately-Intervention and Maintenance	44%	100%		50%	100%	
	Engagement in Self-Monitoring behavior	44%	100%		50%	100%	
	Independently Self-Monitoring	44%	100%		50%	100%	
	Independently Self-Monitoring	44%	100%		50%	100%	

treatment fidelity score was derived by adding up these three numbers, dividing by 6, and multiplying by 100.

A score of 2 was given if the teachers provided the student with the self-monitoring materials, and a score of 0 was given if teachers required the researcher to prompt them to give the student the self-monitoring material. If the student required prompting to use the self-monitoring system and the teacher provided prompting, a score of 2 was given. If the student did not require prompting (e.g., the student was not given enough time to self-monitor, a teacher prompt was delivered as the student was self-monitoring) and the teacher provided a prompt one or more times during each intervention and maintenance session, a score of 0 was given.

For adherence to the consequence schedule, a score of 2 was given if the teacher made reinforcement available to the student when the student met the contingency. If reinforcement was provided when the student did not meet the contingency, a score of 0 was provided. For Isaac, John, and Madison, reinforcement was delivered at the end of the activity if they met the contingency. Thus, either a score of 2 or 0 was given for reinforcing according to the contingency at the end of the activity. For Davis, reinforcement was delivered after every interval of appropriate sitting. As such, an average of the number of times reinforcement was delivered according to the contingency was derived. On a few occasions, Davis took more than one reinforcer from the container when the contingency was to earn one reinforcer if he sat the entire interval or took a reinforcer when the teacher was not looking even though he had not met the contingency. If the teacher was not able to stop him for taking more than one reinforcer or taking a

reinforcer when he had not met the contingency, a score of 0 was given for that interval.

Experimental Design

A multiple-probe design across teachers with generalization probes was used to determine the effect of a self-monitoring treatment package on student and teacher behavior. For the first two participants, a reversal phase was conducted. A reversal phase was not possible with John since he left before the school closed or with Madison since there was not sufficient time for a reversal before the school closed. Each teacher was asked to develop a self-monitoring intervention for her student and to implement the intervention within a multiple probe design. The following were the phases of this study: Baseline, self-monitoring treatment package (i.e., teacher training on self-monitoring, feedback on the self-monitoring intervention developed, teachers train students to self-monitor and receive feedback), maintenance, and generalization.

Procedures

This section describes the procedures that were used in this study including baseline data collected for all teachers, both on teacher and student behavior, and the self-monitoring treatment package. See Table 15 for a summary of the components of the self-monitoring treatment package.

Baseline

Teachers were asked to select one student who needed to increase appropriate classroom behavior and whom they believe would benefit from using a self-monitoring system. Teachers were asked to answer social validity questions related to their current use of self-monitoring systems in the classroom and the perceived value of the systems.

Baseline data were collected during the training and generalization activities. During baseline, teachers were asked not to change their instruction in any way. Baseline data was collected on both teacher and student behavior.

Table 15. Components of the self-monitoring treatment package.

Self-Monitoring Component	Description
1. Teacher self-monitoring training	Each teacher individually received a self-monitoring training. They were provided with a handout and oral description of each the following topics: general information about self-monitoring, advantages of using self-monitoring systems, self-monitoring systems and students with developmental disabilities, how to create a self-monitoring system, and guidelines on teaching students to use self-monitoring systems. Teachers provided correct answers to the Teacher Response Form to indicate they understood the concepts covered during the self-monitoring training and reported feeling confident in their knowledge of self-monitoring before moving to the next step.
2. Developing a self-monitoring intervention	Teachers were given a rubric and asked to develop a self-monitoring intervention for their student. They were provided up to 2 weeks to develop a self-monitoring intervention. They then met with the researcher to receive feedback on the self-monitoring intervention they developed.
3. Student training to self-monitor	Teachers trained the students to self-monitor. They instructed the students on appropriate sitting; taught them to distinguish between appropriate and inappropriate sitting; explained the purpose, method, and steps of the self-monitoring system; modeled self-monitoring; and role-played with the student. Teachers were provided with feedback while they trained their student to self-monitor.
4. Implementing the self-monitoring intervention in the classroom	Teachers were provided with feedback while they implemented the self-monitoring intervention in the classroom. During intervention, the researchers provided feedback to teachers to ensure that teachers were correctly instructing the students to self-monitor. Teachers then implemented the self-monitoring intervention without researcher feedback (maintenance).
5. Generalization training	Teachers who requested assistance to utilize the self-monitoring intervention in another activity, with other target behaviors, or with other students were provided with generalization training. The researcher provided as much training and feedback as requested by the teacher.

Self-Monitoring Training

After a stable pattern of baseline data were collected, the first teacher participant was trained on the use of self-monitoring interventions. Each teacher was trained independently. The handout that was provided to teachers during self-monitoring training is shown in Appendix P. This handout provided an outline of the following topics that were covered during training: general information about self-monitoring, advantages of using self-monitoring systems, self-monitoring systems and students with developmental disabilities, how to create a self-monitoring system, and guidelines on teaching students to use self-monitoring systems. Teachers were encouraged to ask questions.

During the teacher training on self-monitoring, each teacher was first given a general description of self-monitoring and its components. The advantages of using self-monitoring systems (e.g., relatively easy-to-use strategy, promotes generalization, promotes self-determination) were then discussed. Teachers were given information on previous research that used self-monitoring systems with students who had developmental disabilities. Information on the skills that were targeted in previous research were discussed, including play skills (i.e.. imaginary play, drawing), social skills (i.e., negative statements, requesting, commenting, sharing, interacting with customers, asking more questions during a conversation, decreasing the number of repetitions in a conversation), and work/academic skills (i.e., following directions, work task completion, academic survival skills, units of work produced, on-task behavior).

How to create a self-monitoring system was then presented. Teachers were told to select a target behavior that was observable, to target the most important dimension of

that behavior, and to define the behavior very specifically. Teachers were then to select a time when the self-monitoring intervention would be used. Three components for selecting a self-monitoring system were discussed: method of recording the target behavior, method of data collection, and type of system. The two methods discussed that can be used to record the target behavior were cued and non-cued. Cued self-recording occurs when the students receive a signal (e.g., tone, watch, timer) to record their behavior, and non-cued self-recording occurs when students are asked to record every time they engage in the target behavior.

The researcher then talked about four methods the student can use to record the occurrence of the target behavior. Event recording was one method, and examples of ways that students can keep track of their behavior through event recording were given (e.g., tally marks, wrist counters, paper clips). Although event recording is relatively easy, teachers were informed of three considerations: (a) Event recording is difficult if the behavior occurs too frequently, (b) the behavior must have a clear beginning and end, and (c) event recording is not an accurate measure of behavior that occurs for extended periods of time (e.g., being on task, playing alone, listening, etc.).

Time-sampling procedures were also discussed. Teachers were told to divide the observation period into equal intervals and record the behavior at the end of the interval. A timing device to signal the beginning and end of the interval is used. Teachers received information on three types of time sampling: Whole-interval recording, partial-interval recording, and momentary time sampling. For whole-interval recording, whether or not the behavior occurred for the entire interval is recorded at the end of each interval.

Whole-interval recording can underestimate the occurrence of behavior, especially if large intervals are used for short-duration behaviors. Teachers were informed that for partial-interval recording, behavior is recorded at the end of each interval depending on whether the behavior occurred at any time during the interval. Partial-interval recording is used for measuring behaviors that have a clear beginning and end and do not last for a long time. However, partial-interval recording can overestimate the occurrence of behavior, especially if large intervals are used for short-duration behaviors. Information on how momentary time sampling is used (i.e., records whether the behavior is occurring at the end of each interval) and that it can overestimate or underestimate a behavior was then discussed.

The researcher provided information to teachers on the type of system they can use with their students. Teachers were told to consider students' fine motor abilities in order to select material that makes self-monitoring easy and simple for the students. Paper and pencil and three-dimensional systems were described and examples of each self-monitoring system were given.

The use of reinforcement as a component in self-monitoring interventions was then discussed. Types of reinforcers described were primary reinforcers (e.g., M & Ms®, Skittles®, Goldfish®, etc.) and secondary reinforcers. Secondary reinforcers include tangible objects (e.g., books, stickers, puzzles) and non-tangible objects (e.g., high fives, hugs from a teacher or friend). The researcher provided hints for using reinforcers. For example, teachers were told that if they use a reinforcer that is not available during another time of day, the student might be more motivated to obtain it. Teachers learned

about satiation and were then instructed on the use of differential reinforcement. For example, if students correctly monitor their own behavior but do not engage in appropriate behavior, reinforcement is delivered differently than if the students correctly monitor their own behavior and engage in appropriate behavior.

When selecting a reinforcer, teachers were told to choose items that they know the student likes. Teachers can seek input from other teachers, paraprofessionals, parents, and therapists who are familiar with the student to select reinforcers. Next, the researcher discussed how to decide the quantity of reinforcers to select. Teachers can choose to have one or more reinforcers for the self-monitoring intervention. To use differential reinforcement, it is helpful to have two or more reinforcers. Differentially reinforcement can also be used by varying the amount of the same reinforcer. If teachers have more than one reinforcer, the students can choose what they would like to work for that day. The advantages of having more than one reinforcer are that teachers can ask students to select which reinforcer they would like to receive that day and that having more reinforcers may be helpful to ensure that they continue to be highly preferred. The disadvantages of using more than one reinforcer are that there will be fewer reinforcers available for use during other times of the student's day if the reinforcer is used only during this activity and that the student may have only a few highly preferred items.

The researcher then talked to teachers about three ways in which reinforcement can be delivered: The teacher delivers the reinforcers to the students, someone else delivers the reinforcers to the students, or the students deliver their own reinforcers (i.e., self-reinforcement). Teachers were then instructed on how to set the contingency for

receiving reinforcement and the goal for the students. Teachers were told to set realistic goals by considering the student's current level of performance and initially requiring only a small change; that is, teachers can start with small goals and build to larger goals. Teachers were also told they could consider how other students in the classroom behave to set a final goal for the participating student.

Teachers were then instructed on how to maintain desired student behavior. The researcher discussed fading self-monitoring systems by increasing the expectation, decreasing the frequency that the student uses the self-monitoring intervention, and eliminating the use of tangible self-monitoring material. Teachers should ensure that the students are able to maintain their behavior when use of a self-monitoring system is faded. It may not be necessary to fade all self-monitoring systems, depending on the type of system. For example, many adults use planners and to-do lists. These are acceptable and functional self-monitoring systems.

Next, the following eight guidelines on teaching students to use self-monitoring systems were verbally described. First, teachers explain to the students the behavior that they will be self-monitoring. Second, teachers provide the students with examples and non-examples of the behavior. Third, teachers explain the purpose, method, and steps of self-monitoring. Teachers were instructed to teach the students specifically about the steps of the self-monitoring system. Fourth, teachers model self-monitoring and provide examples and non-examples of the target behavior. Fifth, teachers role-play with the students by delivering directions while the students practice examples and non-examples of the target behavior. The students self-monitor during role-play. Teachers give the

students verbal praise when they correctly self-monitor and corrective feedback for incorrect steps/responses. Teachers provided the students with their choice of reinforcement when they correctly self-monitor. Sixth, training continues until the students learn to correctly self-monitor. Seventh, it was recommended that training sessions be no longer than 15 minutes, and if the students have not learned to self-monitor during one training session, training resumes another day. Eighth, teachers ask the students to use the self-monitoring system in the classroom. Initially, for the first couple of sessions at most, teachers provide the student with feedback regarding their accuracy of self-monitoring. After several sessions, teachers allow the students an opportunity to self-monitor independently, given that research has shown that a self-monitoring intervention can be effective even if the student is not monitoring accurately. Teachers should expect that the student's accuracy of self-monitoring will improve with time, especially if differential reinforcement is used for correct self-monitoring. Teachers should evaluate whether the student's behavior is improving.

After all the information in the Self-Monitoring Training Handout (Appendix P) was explained, each teachers was asked to provide responses to indicate they understood the concepts covered during the self-monitoring training. If teachers provided incorrect responses, corrective feedback was given, and teachers were asked to provide another example. The same protocol continued until teachers provided a correct response. This protocol was followed for the 11 questions: (a) Provide an operational definition of their choice of behavior; (b) give an example of event recording; (c) give an example of whole-interval recording; (d) provide an example of partial-interval recording; (e)

provide an example of momentary time sampling; (f) provide an example of a paper and pencil self-monitoring system that corresponds to the behavior they operationally defined earlier; (g) provide an example of a three-dimensional system that corresponds to the behavior they operationally defined earlier; (h) provide examples of reinforcers that can be used for the self-monitoring system and state how these reinforcers were selected; (i) state how differential reinforcement can be used with the aforementioned reinforcers; (j) set an appropriate contingency for the selected reinforcers and identify who will be delivering the reinforcers; and (k) provide an example of how fading can be used for the target behavior and the self-monitoring systems they described previously.

After teachers gave correct responses for Items 1-11 in the Teacher Response Form (Appendix Q), they were asked if they felt confident in their knowledge of self-monitoring and were ready to continue. If teachers did not answer yes to this question, they were asked to state what specific areas they did not feel comfortable with. These areas were reviewed and explained until teachers reported that they felt confident in their knowledge of self-monitoring and were ready to continue. The researcher recorded the areas that were reviewed under Item 12 of the Teacher Response Form (Appendix Q). Teacher self-monitoring trainings averaged 50 minutes (range 30-70 min). See Table 16 for more information about length of teacher self-monitoring training.

Teachers Developed a Self-Monitoring Intervention and Received Feedback

Teachers were asked to create a self-monitoring system for a student using the strategies they learned during the self-monitoring training. The self-monitoring system they created was utilized during one specific classroom activity during which they

believed the self-monitoring system would be helpful for their student. After the self-monitoring training, teachers were given a handout (see Appendix R) with a rubric for developing a self-monitoring intervention. This handout was intended as a guide for teachers to use in developing the self-monitoring intervention. To complete this step, teachers needed to provide an operational definition of the target behavior (i.e., Item 1) and an example and a non-example of the target behavior (i.e., Items 2 and 3). The teachers also described the classroom activity during which the self-monitoring intervention was to be used (i.e., Item 4), the method of recording the target behavior (i.e., cued or non-cued; Item 5), the method of data collection (i.e., event recording, whole-interval recording, partial-interval recording, momentary time sampling; Item 6), and the type of self-monitoring system (i.e., paper and pencil or three-dimensional; Item 7) they will use to measure the target behavior. Lastly, the teachers chose the reinforcer (i.e., Item 8), indicated how it was chosen (i.e., Item 9), whether they will use differential reinforcement (Item 10), and the contingency for receiving reinforcement (i.e., Item 11).

Table 16. Teacher and student self-monitoring training.

Participants (Teacher/ Student)	Length of Teacher Self-Monitoring Training	Length of Self-Monitoring Intervention Feedback	Number of Student Self-Monitoring Training Sessions	Length of Student Self-Monitoring Training
Beatriz/Isaac	1 hr 10 min	40 min	4	47 min
Anna/Davis	50 min	50 min	7	2 hr 47 min
Lizette/John	30 min	50 min	5	56 min (15 min 1-to-1, 41 min in other activities)
Dani/Madison	50 min	45 min	3	34 min

Note. As part of the treatment package, teacher's spoke to the researcher less than 10 minutes after each training and intervention session.

Teachers were given up to 2 weeks to develop a self-monitoring intervention. They then meet with the researcher to discuss the intervention. Teachers were asked to bring the completed rubric (see Appendix R) for developing a self-monitoring intervention to this meeting. The researcher provided teachers with feedback on the self-monitoring intervention they developed and answered any questions. For example, Beatriz choose to develop a self-monitoring system to use during Circle Time. The researcher provided guidance and feedback on the system as it related to that specific activity. If teachers asked if they should use the system during another time of day, they were told to do what they thought was best. Thus, teachers were neither discouraged nor directed to use the self-monitoring system during other classroom activities. Self-monitoring intervention feedback sessions lasted an average of 46 minutes (range 40-50 min) for each teacher. See Table 16 for specific information on the length of the self-monitoring intervention feedback sessions for each teacher.

Teachers Trained the Students to Self-Monitor and Received Feedback

Teachers trained students to self-monitor by following the guidelines that were provided during the self-monitoring training, but training was individualized for each student. First, teachers instructed the students on what appropriate sitting was following the operational definition but defining it in terms the students would understand. Students were taught by the teacher to distinguish between appropriate and inappropriate sitting. For Isaac and Davis, role-playing was utilized to teach appropriate and inappropriate sitting. The teacher modeled the target behavior and inappropriate behavior, and the student was asked to identify if the teacher was or was not sitting appropriately. Isaac and

Davis both answered the question “Am I sitting appropriately?” when the teacher was modeling appropriate and inappropriate sitting and “Are you sitting appropriately?” when the student was asked to model appropriate and inappropriate sitting. Isaac used a visual with the written words “yes” and “no” to vocally answer to these questions. Davis answered by shaking his head or using his Dynavox V™.

For John and Madison, pictures of the student were utilized to teach appropriate and inappropriate sitting. John responded with a vocal yes or no to the question, “Is this appropriate sitting?” while looking at a picture of himself sitting or not sitting appropriately. Dani first attempted to teach Madison appropriate and inappropriate sitting through role-playing. However, Madison did not respond well. She cried and was very upset. Thus, Dani developed a different way to teach Madison appropriate and inappropriate sitting. A folder activity was made since Dani knew Madison enjoyed folder activities. The left side of the folder was labeled with a Boardmaker© picture of a stick figure sitting with the written phrase “sitting in chair” at the top, and the right side was labeled with a Boardmaker© picture of a stick figure sitting with an X over the picture and the written phrase “NOT sitting in chair” at the top. Madison was asked to sort pictures of herself sitting appropriately under the left side of the folder and pictures of herself sitting inappropriately under right side of the folder. Madison was asked, “Is this sitting in chair or not sitting in chair?” as she was shown a picture of herself sitting appropriately or inappropriately. Madison responded by putting the picture on a piece of Velcro® under the correct side of the folder.

All students received corrective feedback from their teachers for an incorrect or no response (e.g., “This is not sitting appropriately because my bottom is not on the chair”.) Prompts included vocal (e.g., telling the student to say “yes” or “no”), gesture (e.g., signing or shaking head “yes” and “no”), and pointing (e.g., pointing to the correct visual response). The system of least prompts was used (West & Billingsley, 2005). If student answers correctly, verbal praise was delivered. In addition, Davis received a small edible reinforcer (e.g., one Skittle®, Sour Patch®) for correct responses. This part of the training continued until the student correctly identified appropriate and inappropriate sitting for 80% of trials.

Teachers then explained the purpose, method, and steps of the self-monitoring system. Teachers taught the students each step of the self-monitoring system and modeled self-monitoring. Teachers role-played with the students by delivering directions while the students practiced examples and non-examples of the target behavior. The students self-monitored during role-play. Teachers gave the students verbal praise when they correctly self-monitored and corrective feedback for incorrect steps/responses. Verbal praise was provided to all students when they correctly self-monitored, and John received a small edible reinforcer. Role-playing was individualized for each student. For Isaac, Beatriz sat him in the Circle Time area and ran through the activities of a typical Circle Time. However, Isaac displayed close to zero rates of inappropriate sitting. He did not have difficulty sitting appropriate during a 1-to-1 activity. As such, training was concluded and Isaac began to utilize the self-monitoring system during Circle Time.

Anna created a similar Morning Routine situation for Davis to learn to self-monitor during training. Anna sat him in the area where Morning Routine took place and taught him to use the self-monitoring system. She first had him identify the parts of the self-monitoring system. Anna asked him "Which one means yes?" and Davis was to point to the green happy face; "Which one means no?" and Davis was to point to the red X; and "Which one means sitting?" and Davis was to point to a square with a picture of a stick figure sitting on a chair. At the beginning of each training session, Ann reviewed yes, no, and sitting with Davis. She then focused on teaching him to correctly identify if he was sitting appropriately by selecting the green happy face or not sitting by selecting the red X. Davis received praise and one edible reinforcer. Once he consistently identified sitting and not sitting correctly, he was only given a small edible reinforcer for self-monitoring appropriate sitting and received verbal praise for self-monitoring inappropriate sitting. Anna slowly faded the amount time she sat with Davis since he had greater difficulty sitting appropriately when adults were not sitting at the table with him. When Davis was able to self-monitored independently and correctly for 80% of trials, self-monitoring training was discontinued and the self-monitoring intervention was introduced during Morning Routine.

Anna utilized a timer for potty training students throughout the day. Prior to the teacher's use of the timer for potty training other students in Davis' class, when the timer would beep, Davis would respond by turning his head in the direction he heard the timer. When self-monitoring training began for Davis, he was no longer responding to the beeping of the time. During Davis' self-monitoring training, when the timer was used to

indicate to Davis that he needed to self-monitor, he sometimes needed a verbal reminder to check his timer. The teacher felt that it would take Davis some time to learn to respond to the timer, but that he would eventually be able to do so. During training the criteria for independent self-monitoring did not include independently turning off the timer. If Anna gave him a verbal instruction to check the timer and Davis completed the other self-monitoring steps correctly, the trial was counted as independent. This decision was made because Davis was able to accurately and independently give himself a green happy face if he was sitting or a red X if he was not sitting. During the intervention phase of this study, however, independent self-monitoring included turning off the time without teacher direction.

After John was able to correctly identify appropriate and inappropriate sitting, Lizette attempted to use a video of John during Math to teach him to self-monitor. However, John was not interested in the tape and had great difficulty attending to it. As such, Lizette chose to train Davis to use the self-monitoring system during two activities that she was not leading so that she could devote her attention to prompting him as needed. Once John self-monitored independently and correctly for 80% of trials, self-monitoring training was discontinued and the self-monitoring intervention was introduced during Math.

When Madison was able to correctly identify appropriate and inappropriate sitting, Dani explained the self-monitoring system. Dani modeled the use of the self-monitoring system and had Madison utilize it. Madison did not have difficulty sitting

during a 1-to-1 activity. As such, training was concluded and Madison began to use the self-monitoring system during Journal.

The researcher was present during all but three self-monitoring student-training sessions to provide feedback and answer teachers' questions. The researcher was not present for Beatriz's third session that lasted 10 minutes due to a schedule conflict. The researcher videotaped the session and discussed the session with Beatriz before the next session. The researcher was present at all of Anna's student-training sessions. The researcher was not present for Lizette's third session which she reported lasted 5 minutes or for Dani's third session which she reported lasted 10 minutes since Lizette and Dani did not notify the researcher about the training.

Length of student self-monitoring training average. See Table 16 for specific information on number and length of each student's self-monitoring training sessions. Although it was recommended that training sessions be no longer than 15 minutes, some teacher held longer self-monitoring sessions since they said their students were used to working 1-to-1 with them for up to 30 minutes.

Teachers Implemented the Self-Monitoring Intervention

Intervention was staggered across the 4 teachers (i.e., Beatriz, Anna, Lizette, and Dani), with baseline continuing for each teacher until stability in both teacher and student behavior was achieved with the preceding teacher. Thus, baseline continued for Anna/Davis until stability in intervention was achieved with Beatriz/Isaac, baseline continued with Lizette/John until stability was achieved with intervention for

Anna/Davis, and baseline continued with Dani/Madison until stability was achieved with intervention for Lizette/John.

The self-monitoring intervention was implemented every day, and data were collected every day during intervention. Teachers were told that the researcher would be observing and videotaping during both classroom activities. If teachers asked if the self-monitoring intervention should be used in the generalization activity, they were told that it was their choice. If at any time teachers asked whether they should use the intervention during another activity or with another student, they were told to do whatever they thought was best. They were not given guidance on how to implement the intervention in another activity or with another student unless they specifically requested assistance from the researcher.

Intervention

During this phase of the study, the researcher provided feedback to teachers as they implemented the self-monitoring intervention during the classroom activity to ensure that they implemented the self-monitoring system with fidelity. The researcher also answered any questions that teachers had during the activity. Before each session, the researcher spoke to teachers briefly (i.e., less than 10 minutes) in person to discuss the previous self-monitoring session. The researcher provided the teachers with feedback only as it related to that specific classroom activity and student. The researcher praised and encouraged the teachers for using strategies learned during training. The researcher was also available to answer any questions the teachers had. When teacher's implemented the self-monitoring intervention with fidelity of 80% or above across 3

consecutive sessions without researcher feedback, the researcher feedback was withdrawn and teachers moved on to the maintenance phase of this study.

The researcher self-monitored whether or not she provided feedback to each teacher during each session. This information was verified by scoring videotapes of the sessions on whether the researcher provided teachers with feedback about the self-monitoring intervention. The first sessions were coded until the researcher had not provided feedback to the teacher for 6 consecutive days. This was done to verify when the maintenance phase started for each teacher. After this criterion was met, videotaped sessions were randomly selected and coded in the same manner. The total percentage of sessions coded from the videotapes was 30% for each participant, and the interobserver agreement between what the researcher self-monitored and what was noted by viewing the videotapes was 100%.

Maintenance

During the maintenance phase, teachers continued to implement the self-monitoring material with their students during the classroom activity but they did not received feedback from the researcher during the classroom activity. In addition, the researcher no longer met with the teacher to discuss the student's performance after each session. During the maintenance phase, data were initially collected every day, and during the later part of the maintenance phase, data were collected from one to five times per week in both the training and generalization activities. Maintenance data were collected to evaluate maintenance of the brief self-monitoring treatment package on teacher and student behavior.

Teacher Requested Generalization Training

The researcher planned on offering additional training to teachers who did not generalize the use of the self-monitoring intervention to another classroom activity after there was a stable pattern of responding for all teachers. However, this did not occur until one week before the end of the school year. As such, the researcher did not specifically offer additional training to teachers to utilize the intervention during another classroom activity. However, the researcher was available to provide further training and feedback to teachers if they requested assistance to utilize self-monitoring intervention in another activity, with other target behaviors, or with other students. The researcher provided as much training and feedback as requested by the teacher.

Social Validity

Social validity was measured by determining whether the teachers generalized the use of the self-monitoring intervention to other classroom activities without additional training or guidance from the researcher. The underlying assumption was that if teachers valued the intervention, they would continue to use it. Teachers may also show that they valued the self-monitoring intervention by requesting additional training from the research to utilize the self-monitoring intervention in another activities, with other target behaviors, or with other students.

Social validity was measured directly by asking teachers a series of questions related to their use of self-monitoring strategies with students in their classroom and their beliefs regarding whether a self-monitoring intervention would benefit their students (see Form for Identifying Student Participants in Appendix A). Item 2 on the form was

presented in a yes/no format: “Are you using a self-monitoring system with Student 1?” The responses to the following items, items 3a and 3b on the form, were given using a 5-point Likert scale, with 1 = *disagree*, 2 = *somewhat disagree*, 3 = *neither agree nor disagree*, 4 = *somewhat agree*, and 5 = *agree*. If the teacher was using a self-monitoring system with that student, the second item read, “I believe that the student is benefiting from the self-monitoring intervention.” If the teacher was not using a self-monitoring system with that student, the second item read, “I believe that the student would benefit from the use of a self-monitoring intervention.” The same two questions were asked of each student. These questions were part of the process for helping teachers select a student for whom to develop a self-monitoring system for this study, as previously described in the section on teacher participants and in the form presented in Appendix A.

Social validity was further assessed by comparing the number of students who were using a self-monitoring system prior to the study to the number of students who were using a self-monitoring system by the end of the study. In addition, the number of students that the teacher believed would benefit from a self-monitoring intervention at the beginning of the study was compared to the number of students that the teacher believed would benefit from a self-monitoring intervention at the end of the study.

CHAPTER 4

RESULTS

This chapter presents the results of the self-monitoring treatment package on teacher and student behaviors. Results are presented in four sections. In the first section, results on teacher behavior during intervention (i.e., with researcher feedback) and maintenance (i.e., without researcher feedback) are discussed. The second section reports results on student behavior during intervention and maintenance. Generalization data are presented in the third section. The final section discusses social validity.

Teacher Behaviors

Data on teacher behavior are collectively summarized below. Two teachers (i.e., Anna and Lizette) moved to the maintenance part of this study on the fourth day they implemented the self-monitoring intervention in the classroom, and 2 teachers (i.e., Beatriz and Dani) moved to the maintenance part of this study on the fifth day they implemented the self-monitoring intervention in the classroom. See Tables 17-20 for results on teachers' target behaviors (i.e., amount of time that the self-monitoring material was available, prompts to engage in the target behavior, prompts to self-monitor, adherence to the consequence schedule) including averages and range.

Amount of Time that the Self-Monitoring Material was Available

During intervention and maintenance, the amount of time that the self-monitoring material was available to the student was 100% for all students in all sessions. Beatriz, Lizette, and Dani provided the self-monitoring material to their students every day. During Morning Routine, Anna was usually assisting students in the bathroom while

Anna's supporting teacher assisted students with setting up their schedule. Initially, Anna asked her supporting teacher to trade places with her so that she could provide the self-monitoring system to Davis, prompt him if necessary, and reinforce him. After 8 days of having Davis utilize the self-monitoring system, Anna returned to assisting students in the bathroom and asked her supporting teacher to give Davis the self-monitoring system, prompt him if necessary, and reinforce him for sitting during the entire interval. Anna's supporting teacher had been observing Anna, and she implemented the intervention appropriately. If she had questions, she asked Anna. Occasionally, Anna would also provide Davis verbal praise for sitting after he self-monitored.

Table 17. Results for Beatriz during intervention and maintenance.

	Amount of Time that Self-Monitoring Material was Available	Prompts to Engage in the Target Behavior	Prompts to Self-Monitor	Adherence to the Consequence Schedule
Baseline Average (Range)	0%	0.88 (.21-1.48)		
Intervention Average (Range)	100%	0.18 (.15-.2)	.25 (.18-.3)	100%
Maintenance Average (Range)	100%	0.12 (0-.19)	.10 (0-.27)	100%
Return to Baseline Average (Range)	0%	0.99 (.42-1.56)		
Maintenance Average (Range)	100%	0.12 (0-.33)	.07 (0-.27)	100%

Note. Prompts to engage in the target behavior and prompts to self-monitor reflect an average per minute.

Table 18. Results for Anna during intervention and maintenance.

	Amount of Time that Self-Monitoring Material was Available	Prompts to Engage in the Target Behavior	Prompts to Self-Monitor	Adherence to the Consequence Schedule
Baseline Average (Range)	0%	.78 (.08-1.8)		
Intervention Average (Range)	100%	.16 (.11-.22)	.6 (.5-.67)	94.4% (83.3-100%)
Maintenance 1-Minute Interval Average (Range)	100%	.08 (0-.63)	.4 (.08-.79)	97.7% (60-100%)
Return to Baseline Average (Range)	0%	0.54		
Maintenance 1.5-Minute Interval Average (Range)	100%	.09 (0-.27)	.38 (.18-.71)	100%
Maintenance First 2.5-Minute Interval Average (Range)	100%	.34 (.21-.46)	0.27	100%
Maintenance 2-Minute Interval Average (Range)	100%	.12 (0-.40)	.13 (0-.27)	100%
Maintenance Second 2.5-Minute Interval Average (Range)	100%	.12 (0-.25)	.09 (0-.14)	100%

Note. Prompts to engage in the target behavior and prompts to self-monitor reflect an average per minute.

Table 19. Results for Lizette during intervention and maintenance.

	Amount of Time that Self-Monitoring Material was Available	Prompts to Engage in the Target Behavior	Prompts to Self-Monitor	Adherence to the Consequence Schedule
Baseline Average (Range)	0%	.56 (.08-1.25)		
Intervention Average (Range)	100%	.16 (.11-.21)	.38 (.32-.5)	100%
Maintenance Average (Range)	100%	.07 (0-.21)	.17 (0-.27)	100%

Note. Prompts to engage in the target behavior and prompts to self-monitor reflect an average per minute.

Table 20. Results for Dani during intervention and maintenance.

	Amount of Time that Self-Monitoring Material was Available	Prompts to Engage in the Target Behavior	Prompts to Self-Monitor	Adherence to the Consequence Schedule
Baseline Average (Range)	0%	.24 (0-.67)		
Intervention Average (Range)	100%	0.02 (0-.07)	.02 (0-.07)	100%
Maintenance Average (Range)	100%	.03 (0-.15)	.03 (0-.15)	100%

Note. Prompts to engage in the target behavior and prompts to self-monitor reflect an average per minute.

Prompts to Engage in the Target Behavior

See Figure 6 for data on rate per minute of number of prompts to engage in the target behavior for Beatriz, Anna, Lizette, and Dani. Please note that the scales on each graph in Figure 6 are different. The rate of teacher prompts to sit appropriately (e.g., "you need to have your bottom on the chair") or not sit inappropriately (e.g., "don't stomp your

feet") decreased for all teachers when self-monitoring was implemented during intervention and maintenance. Specifically, the average rate per minute for the number of prompts the teacher gave to the student to engage in the target behavior or not to engage in a competing behavior averaged .59 (range .24-.94) times per minute during baseline and return to baseline, .13 (range .02-.18) times per minute during intervention, and .09 (range .03-.015) times per minute during maintenance. Results on prompts to engage in the target behavior are presented individually for each teacher in Tables 16-19. When the students utilized the self-monitoring intervention, teachers provided substantially fewer prompts to sit appropriately.

Prompts to Self-Monitor

See Figure 7 for data on rate per minute of teacher prompts to self-monitor for Beatriz, Anna, Lizette, and Dani. Please note that the scales on each graph in Figure 7 are different. The rate of teacher prompts to self-monitor decreased over time. Rate per minute of teacher prompts to self-monitor was .31 (range .02-.6) during intervention and .13 (range .03-.25) during maintenance. Results on prompts to self-monitor are presented individually for each teacher in Tables 16-19. The data indicate that as the students had more practice using the self-monitoring system, they required fewer teacher prompts to self-monitor.

Adherence to the Consequence Schedule

Teacher adherence to the consequence schedule ranged from 94.4-100% during intervention and 97.7-100% during maintenance. Results on adherence to the consequence schedule are presented individually for each teacher in Tables 16-19.

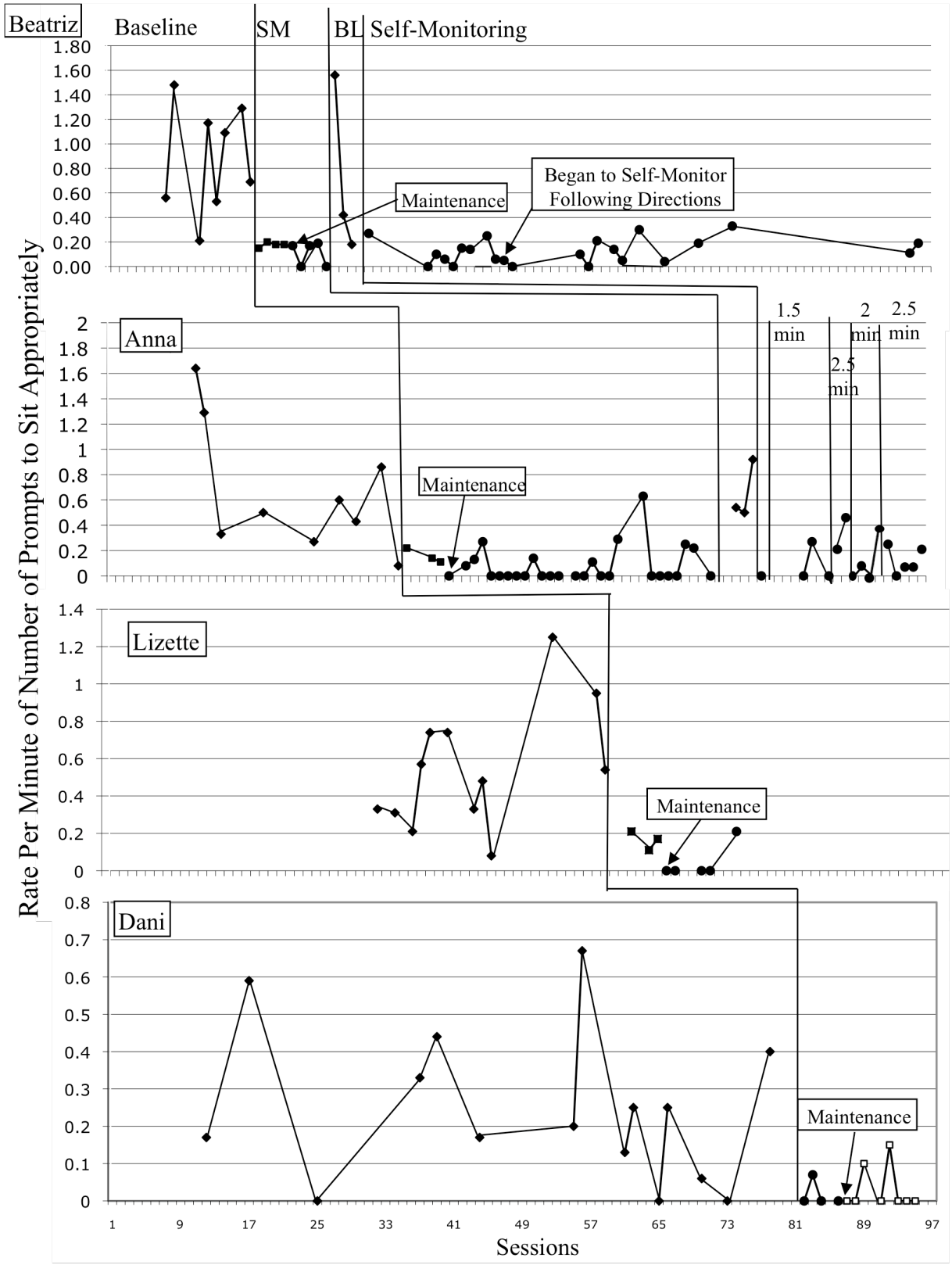


Figure 6. Rate per minute of number of prompts to engage in the target behavior for Beatriz, Anna, Lizette, and Dani.

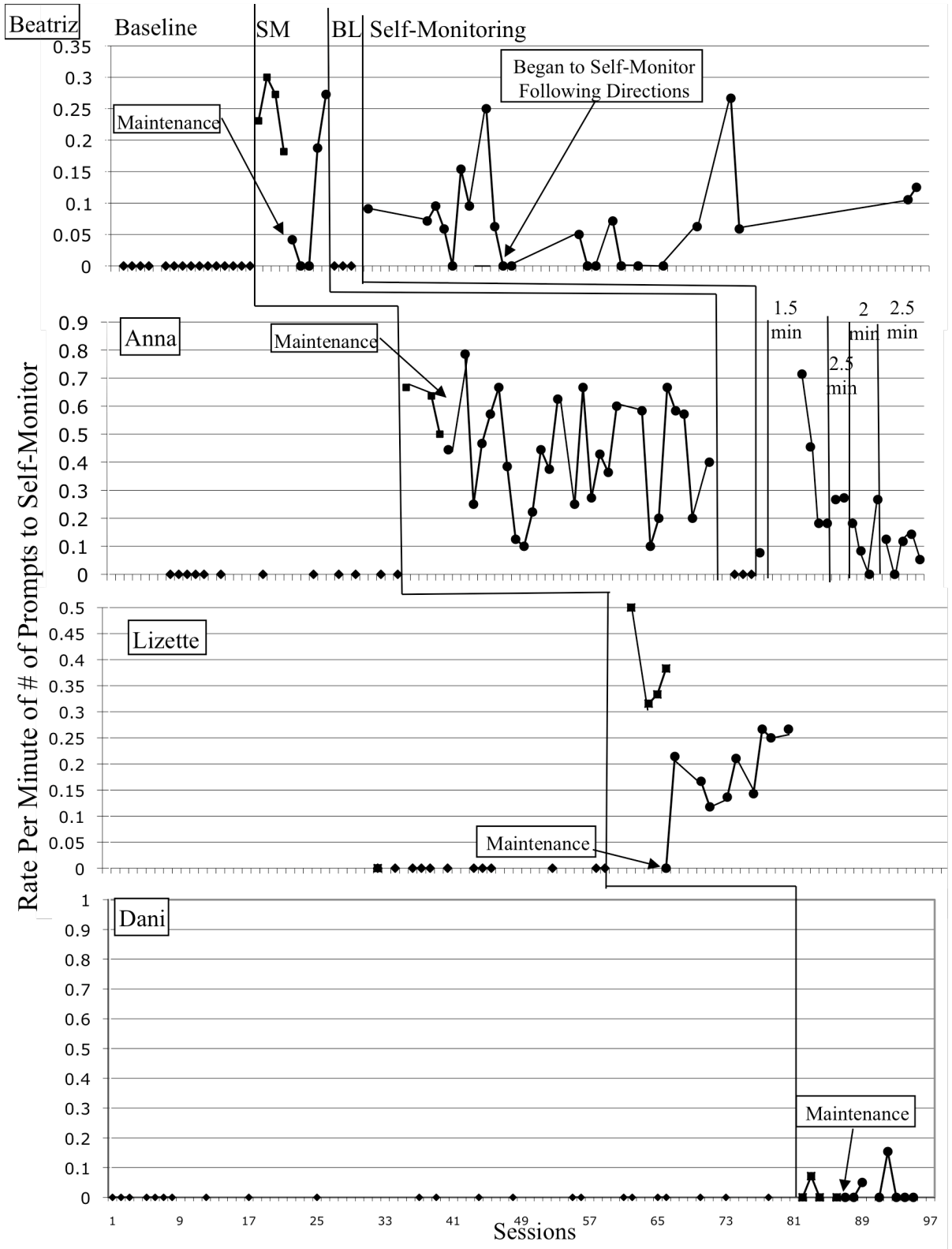


Figure 7. Rate per minute of teacher prompts to self-monitoring for Beatriz, Anna, Lizette, and Dani.

Beatriz

At the end of the activity, Isaac was given a small sticker (i.e., .5 inches in diameter) as reinforcement if he met his goal. The sticker was used because his teacher used a class wide behavior system in which the students earned a sticker at the end of each activity if they followed the rules. At first, the contingency for receiving the sticker was 20 or less Xs (i.e., if Isaac sat inappropriately 20 or fewer times during Circle Time, he earned a sticker). Twenty was chosen because Circle Time lasted about 20 minutes and his average rate of inappropriate sitting during baseline was about once per minute. After 2 days of using the self-monitoring system, this number was decreased to 10 since the rate of inappropriate sitting decreased. After the reversal, Beatriz increased the length of time during which the self-monitoring material was available. Isaac initially utilized the self-monitoring system only until attendance, the last activity of Circle Time, and Beatriz's supporting teacher led this activity. This allowed Beatriz the opportunity to review the self-monitoring system with Isaac to see if he earned his sticker. After the reversal, Beatriz added reading a book after attendance and she had Isaac continue to utilize the self-monitoring system while the book was read. For the purposes of this study, data collection ceased at the end of attendance to maintain uniformity with the baseline phase and intervention and maintenance phases before the reversal.

Isaac was asked to identify whether or not he earned a sticker at the end of the activity. He correctly identified every time. His teacher asked him what color sticker he wanted. Initially the teacher would take the sticker and hand it to Isaac and he would put it on the sheet. Later, Isaac took the sticker sheet, selected one, and put it on his sheet.

Thus, Isaac independently administered the sticker reinforcers while receiving vocal praise from his teacher. The only day that Isaac did not earn his sticker was on the day after the reversal.

Anna

For Davis, the timer was initially set to 1 minute and later increased to 1.5 minutes, 2 minutes, and 2.5 minutes. The timer beeped after the interval and Davis pushed the button on the timer twice (i.e., once to make the beeping stop and again to reset it). If Davis did not turn off the timer independently, his teacher instructed him to check his timer. After he pushed the button, Davis either put a green yes face on a picture of a chair if he was sitting appropriately for the entire interval or a red X on a picture of a chair if he was not sitting appropriately for the entire interval.

Differential reinforcement was used with Davis. If Davis was sitting appropriately during the entire interval, he was given verbal praise (e.g. "That's right, you were sitting in your chair!") and was allowed to pick one edible reinforcer from a bin containing a variety of edibles reinforcers (i.e., chips, dry fruit, Jellybeans®, Nerds®, popcorn, pretzels, rice cake, Skittles®, Sour Patch®, Starburst®, Veggie Bootie®). The reinforcers were selected by his teacher based on a preference assessment questionnaire that his parents filled out at the beginning of the year and ongoing preference assessments in the classroom. If Davis was not sitting appropriately during the entire interval but self-monitored independently and correctly, he was given verbal feedback in a neutral tone of voice (e.g., "That's right, you were not sitting. You need to stay in your chair the entire time.") and no edible reinforcer. If Davis was not sitting appropriately for the entire

interval and self-monitored incorrectly, his teacher provided corrective feedback (e.g., "no, you were not sitting"), he was given verbal feedback in a neutral tone of voice (e.g., "you need to stay in your chair the entire time"), and he did not receive an edible reinforcer.

Reinforcement was delivered to Davis by opening a container with primary reinforcers and allowing him to pick out one item. Sometimes he needed to be reminded to take only 1 item. If the teacher didn't immediately open the container and offer it to Davis after he earned a green happy face, Davis would attempt to open the container himself. Most of the time if this happened, he handed it to his teacher to open it for him. On a few of occasions, he was able to open it independently.

Anna or Anna's supporting teacher reinforced Davis based on the consequence schedule at the end of the 1-minute interval during intervention with 94.4% accuracy and during maintenance with 97.7% accuracy. During the later part of the maintenance phase, Anna increased the interval to 1.5, 2, and 2.5 minutes and Anna or Anna's supporting teacher adhered to the consequence schedule with 100% accuracy.

Davis received reinforcement after every time he self-monitored, and verbal feedback was not faded. Instead, the length of the intervals for which he self-monitored was gradually increased. During intervention, Davis earned his reinforcer on 64% (range 57-67%) of the 1-minute intervals. During maintenance and before the return to baseline, Davis earned his reinforcer on 82% (range 33-100%) of the intervals. When the self-monitoring intervention was re-introduced without feedback from the researcher for one day, Davis earned his reinforcer 100% of the 1-minute intervals. Davis earned his

reinforcer 93% (range 73-100%) of the 1-minute intervals when the interval was increased to 1.5 minutes. When the interval was increased to 2.5 minutes, Davis earned his reinforcer for 79% of 1-minute intervals the first day and for 46% of 1-minute intervals the second day. Anna then decided that she had increased the interval too much and used a 2-minute interval the following day. Using the 2-minute interval, on average Davis earned his reinforcer on 85% (range 66.7-100%) of the 1-minute intervals. The interval was then increased to 2.5 minutes and Davis earned his reinforcer an average of 84% (range 75-100%) of the 1-minute intervals.

Lizette

John was given the opportunity to play if he met his goal. Play was chosen as a reinforcer for John since this was the activity he enjoyed most at school. The contingency for receiving the reinforcer varied depending on the length of the Math lesson that day. The contingency was based approximately on staying in his chair for the entire length of the one-minute interval for at least half of the intervals. For example, if the teacher anticipated the activity would take 20 minutes based on the time the activity started, the contingency was for him to get 10 or more lines under the "Yes" column (i.e., he had to be sitting in his chair during the entire length of the 1-minute interval 10 times).

Lizette first attempted to have John wait until the end of the activity to receive his reinforcer. However, during 2 of the first 4 days John became excited when he met the specified criterion and would say, "oh, I got ___, I get to play". Lizette allowed him to go play immediately since this is what John was expecting. On the first and third day, John did not earn his reinforcer. After the fourth session, Lizette waited until the end of the

activity to allow him access to the reinforcer. During intervention, on average John earned his reinforcer during 33.3% of sessions. During maintenance, on average John earned his reinforcer during 55.6% of sessions.

Dani

Dani's teacher reported that Madison responded well to verbal praise and other social interactions, including high fives and tickles, and as such she did not use food reinforcements with her. Tickles were Madison's most preferred reinforcer. Dani chose a high-five as reinforcement because Madison enjoyed high-fives from her and she didn't think that a more powerful reinforcer was necessary. The contingency for receiving a high five was that Madison had 0 X's on her paper (i.e., she sat appropriately during the entire length of the activity). When Madison sat appropriately during the entire activity, Dani showed her the picture of her sitting appropriately that was on the back of her board, gave her verbal praise (e.g., "Good job! You were sitting in your chair the whole time."), and gave her a high five. Madison appeared excited to receive praise and a high five from Dani. When Madison did not sit appropriately during the entire activity, she was given feedback in a neural tone of voice (e.g., "You got up two times today. You need to sit in your chair the whole time."). On average, Madison earned her reinforcer 75% of the time during intervention and maintenance.

Treatment Fidelity

Treatment fidelity data for teacher's implementation of the self-monitoring intervention was calculated for an average of 96.4% (range 95.6-100%) of sessions across teachers. Treatment fidelity included providing the student with the self-monitoring

system, prompting the student only when required, and reinforcing based on the contingency. The average treatment fidelity for teacher participants was 97.9% (range 93-100%). Interobserver agreement on fidelity of treatment was conducted on an average of 49.3% (range 20.4-100%) of the sessions by coding from the videotape. See Appendix O for a sample interobserver agreement treatment fidelity data sheet. Overall interobserver agreement for treatment fidelity averaged 98.6% (range 95.6-100%). See Table 21 for specific data on treatment fidelity and interobserver agreement for treatment fidelity for each participant.

Table 21. Treatment fidelity and interobserver agreement for treatment fidelity for all participants.

	Beatriz	Anna	Lizette	Dani
% of Session for which Treatment Fidelity was Calculated	100%	97.8%	92.3%	100%
Treatment Fidelity	97.9%	98.9%	100%	100%
Treatment Fidelity Range	66.7-100%	91.7-100%		
% of Sessions with IOA	33.3%	30.4%	33.3%	100%
Average IOA	95.6%	98.6%	100%	100%
IOA Range	66.7-100%	91.7-100%		

Student Behaviors

Results of the self-monitoring intervention on rate per minute of inappropriate sitting for Isaac, John, and Madison and rate per minute of 1-minute intervals with inappropriate sitting for Davis are shown in Figure 8. Number of occurrences of independent and prompted self-monitoring for all student participants are shown in Figure 9. Please note that the scales on each graph in Figures 8 and 9 are different.

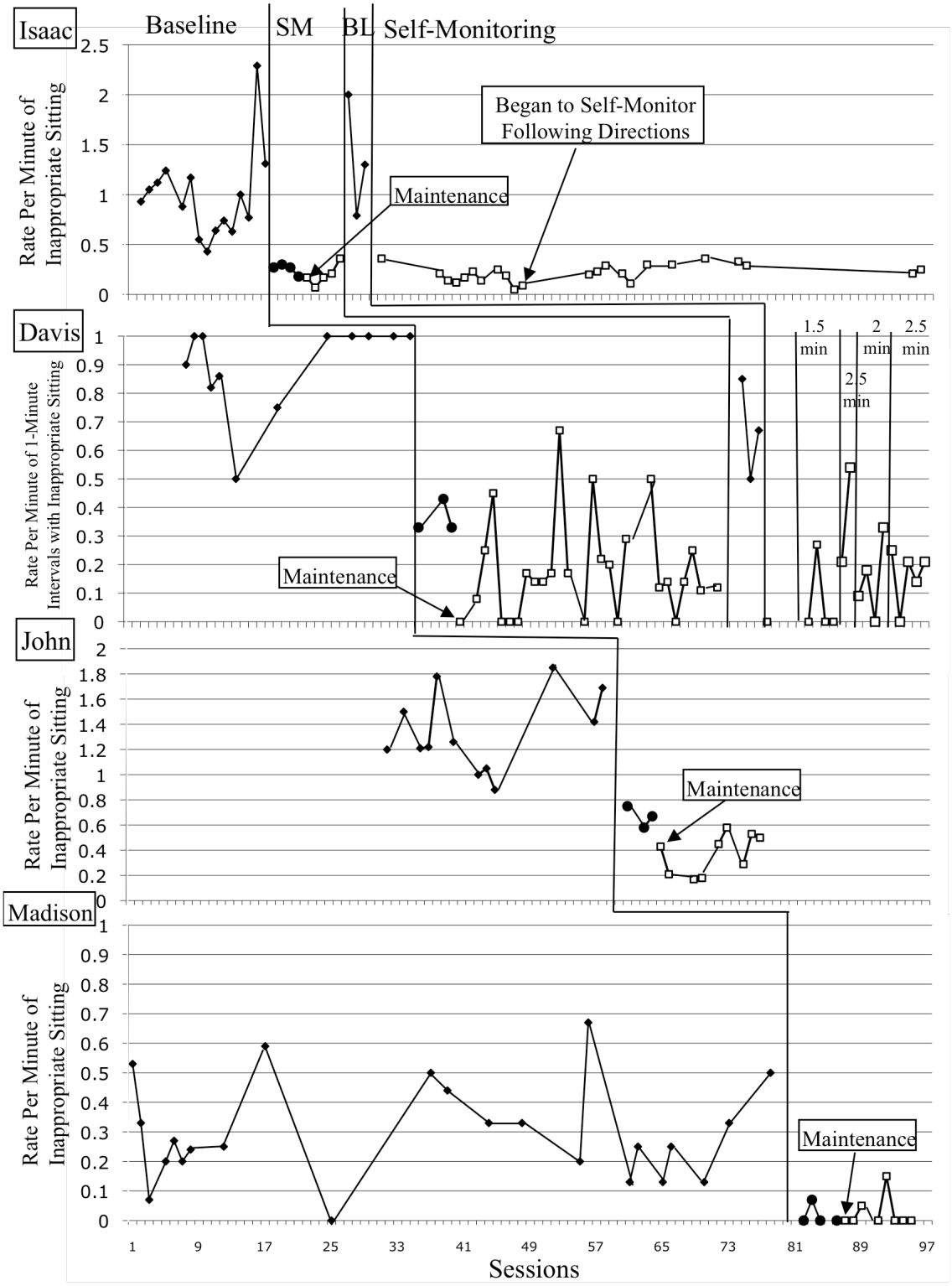


Figure 8. Rate per minute of inappropriate sitting for Isaac, John, and Madison and rate per minute of 1-minute intervals with inappropriate sitting for Davis.

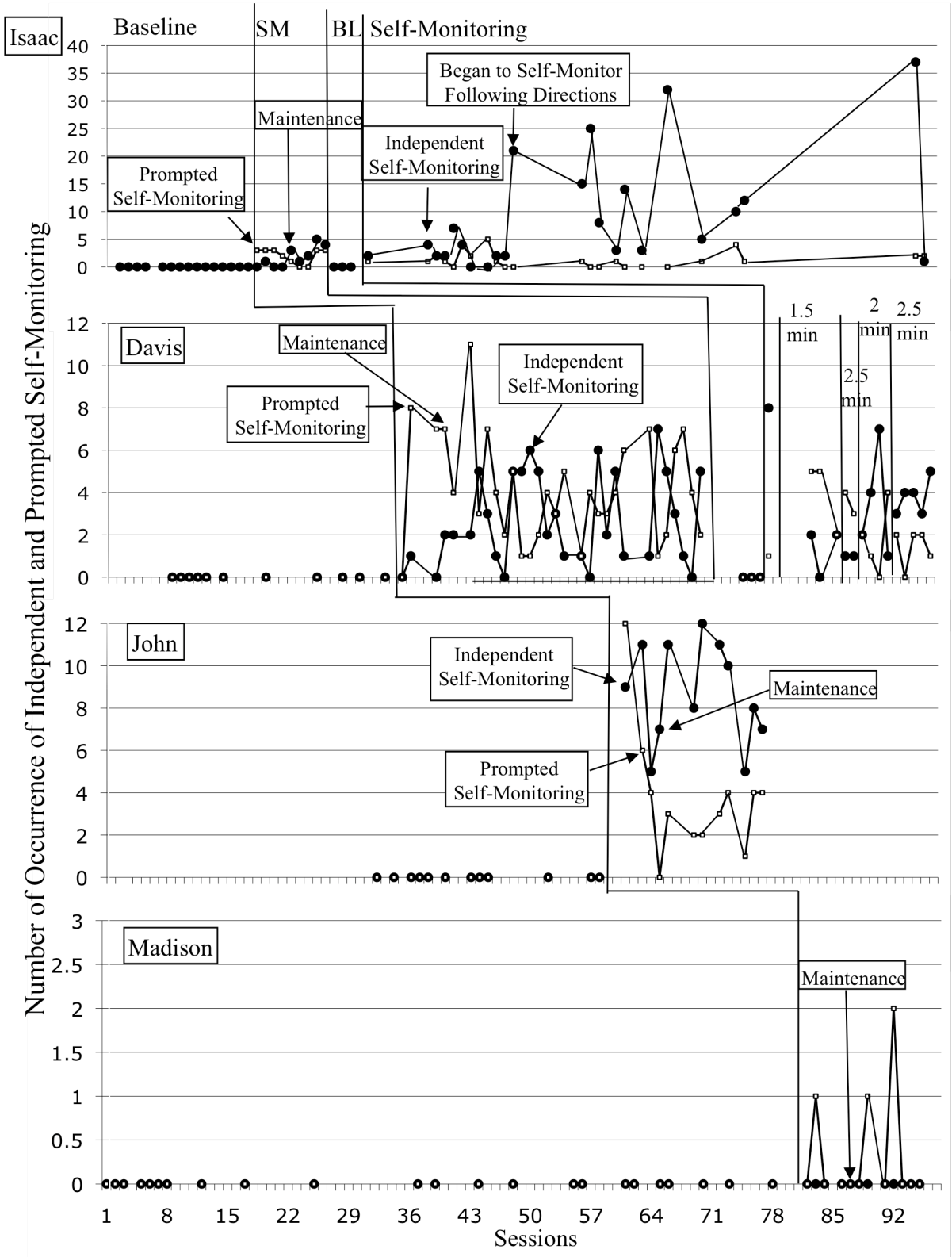


Figure 9. Number of occurrences of independent and prompted self-monitoring for Isaac, Davis, John, and Madison.

Inappropriate Sitting

Isaac

During baseline, Isaac's average rate of inappropriate sitting was .98 (range .43-2.3) times per minute. The OT recommended that a heavy ball be placed on Isaac's lap to help him sit appropriately, and the teacher introduced this intervention after the seventh day of baseline data collection. Initially, the use of the heavy ball decreased inappropriate sitting, but the rate returned to original levels.

When self-monitoring was introduced during Circle Time during the intervention phase, Isaac's average rate of inappropriate sitting decreased to .26 (range .18-.3) times per minute. Researcher feedback to Beatriz was then withdrawn (i.e., maintenance phase) and Isaac's rate of inappropriate sitting remained low at an average of .2 (range .07-.36) times per minute. The self-monitoring intervention was withdrawn for 3 days and Beatriz was asked to not change anything except not to allow Isaac to have access to the self-monitoring material. During this reversal phase, Isaac's average rate of inappropriate sitting was 1.36 (range .79-2) times per minute. When the self-monitoring intervention was reintroduced under maintenance conditions, Isaac's rate of inappropriate seating was again reduced (M=.22, range .05-.37). Maintenance data was taken over a 5-month period.

The next to last baseline session and the first reversal session were higher than the other baseline data points. This may have occurred because Beatriz was absent these days. However, on days when his teacher was absent and Isaac utilized the self-

monitoring intervention (i.e., sessions 4, 9, and 10 after the withdrawal), his rate of inappropriate sitting was undifferentiated from sessions when Beatriz was present.

Generalization. During maintenance, Isaac began to self-monitor following directions (e.g., raising hand to participate, sitting down and raising his hand before getting up when asked to do so by Beatriz). This began the first day before Spring Break and is labeled in Figures 8 and 9. The supporting teacher noticed that when he participated or followed the rules, he would write a number on the side of his self-monitoring sheet. When he participated again, he would delete that number and write the next number (e.g., if he had written 4, he deleted it and wrote 5). Beatriz supporting teacher said that he had learned it from watching her train another student to self-monitor following directions. The other student utilized a sheet similar to Isaac's and his target behavior was following directions. The day after Spring Break, Isaac continued to self-monitor following directions as well as sitting inappropriately in the same manner. Beatriz and her supporting teacher discussed this with the researcher after the activity. They asked if a new self-monitoring sheet should be made to give Isaac space to self-monitor both inappropriate sitting and following directions. The researcher stated that Isaac was independently self-monitoring following directions and they should do what they thought best for Isaac. A new sheet was made for Isaac in which he could monitor following directions on the left side and inappropriate sitting on the right (see Figure 10).

The following day, Isaac was asked if he wanted to use the new sheet to check when he was following directions and not sitting in his chair or the old sheet in which he only self-monitored not sitting in his chair. Isaac picked the new sheet. Beatriz's original

Following Directions

If I follow directions, I will put a "v ".

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30

NOT Sitting in My Chair

If I stand up without raising my hand, I will put an "X".

1	2	3	4	5
6	7	8	9	10

Chair Flat on the Floor

If I follow directions __ or more times **AND**
If I get up without raising my hand __ or less times,
I will get a sticker.

Figure 10. Isaac's self-monitoring sheet for not sitting in his chair and following directions.

intent was to have Isaac make a check on the number when he was following directions. However, Isaac was not very familiar with check marks, and when he read the top of the sheet that said to make a check if he followed directions, he read the check mark as a "v". Thus, Isaac self-monitored following directions by making a "v" under the following directions column and self-monitored not sitting in his chair in the same manner as before. Isaac independently utilized the new self-monitoring sheet and on occasion was encouraged by his teacher to give himself a check for following directions (e.g., "You sang the days of the week with the class. Good job! You can give yourself a v."). Moreover, on a few occasions before Isaac began to self-monitor following directions in addition to not sitting appropriately, the experimenter observed Isaac writing the word "sit" on his self-monitoring sheet as he was sitting appropriately. Isaac's rate of

inappropriate sitting when he began to self-monitor following direction in addition to inappropriate sitting remained low.

A couple of weeks after this, Isaac began to make his own self-monitoring sheets. He turned over the self-monitoring sheet Beatriz gave him and made his own squares on the back. He only made one set of squares but would make "v"s when he was following directions and "x"s when he was sitting inappropriately. Isaac was allowed to use his own sheet and his rate of inappropriate sitting continued to be stable. See Figure 8 for a graph of Isaac's rate per minute of inappropriate sitting during baseline, intervention, and maintenance

Davis

Davis' average rate per minute of 1-minute intervals with inappropriate sitting during baseline was .90 (range .5-1). When self-monitoring was used during the intervention phase, his average rate per minute of 1-minute intervals with inappropriate sitting decreased to .36 (range .33-.43). During the maintenance phase, Davis' rate per minute of 1-minute intervals of inappropriate sitting averaged .18 (range 0-.67). After 10 days of utilizing the self-monitoring system, if Davis was not sitting in his chair and the timer beeped, he independently returned to his chair to turn off the timer, self-monitor, and sit.

The intervention was withdrawn for 3 days and Davis' average rate per minute of 1-minute intervals with inappropriate sitting increased to .67 (range .5-.85). On the second day of withdrawal, Morning Routine was a 1-to-1 activity for Davis which may explain why his rate of inappropriate sitting was lower.

The self-monitoring intervention was then introduced under maintenance conditions for one day, and Davis sat appropriately during the entire activity. At this time, Anna increased the interval from 1 minute to 1.5 minutes. Davis' rate per minute of 1-minute intervals with inappropriate sitting continued to be low (M=.07; range 0-.27), and Anna increased the interval to 2.5 minutes. Davis's rate of 1-minute intervals of inappropriate sitting for the first day was 2.21 but increased to .54 on the second day. Anna used a 2-minute interval the following day, and Davis' average rate of 1-minute intervals of inappropriate sitting was .15 (range 0-.33). After 4 days, Davis' interval was increased to 2.5 minutes and his average rate of 1-minute intervals of inappropriate sitting remained low (M=.16; range 0-.25).

Some data points during intervention were higher than most other points and this may have been a result of a few setting events. For example, on the second day of the intervention phase, Anna tried using an electronic keyboard as reinforcement during the first interval. This was discontinued because Davis became upset when she asked for the keyboard back, and he was upset for the remainder of the session.

John

John's average rate per minute of inappropriate sitting during baseline was 1.34 (range .88-1.85). His average rate per minute of inappropriate sitting decreased to .67 (range .58-.75) during the intervention phase. John's out of chair behavior decreased quickly with the introduction of the self-monitoring intervention, but John continued to struggle with keeping his hands on the table (e.g., interacting appropriately with classroom material and not playing with his hands). During the maintenance phase,

John's average rate per minute of inappropriate sitting continued to decrease (M=.37; range .17-.58). Maintenance data for John were collected over a 3-week period. A reversal was not possible since John withdrew from the school. See Figure 8 for a graph of John' rate of per minute of inappropriate sitting during baseline and intervention.

Madison

During baseline, Madison' rate per minute of inappropriate sitting average .3 (range 0-.67). When the self-monitoring intervention was introduced during the intervention phase, Madison's behavior was more stable with an average rate of .02 (range 0-.07) times of inappropriate sitting per minute. During the maintenance phase, Madison's rate of inappropriate sitting average .03 (0-.15) times per minute. See Figure 8 for a graph of Madison's rate per minute of inappropriate sitting during baseline, intervention, and maintenance.

During baseline, Madison's behavior was variable. On some days, she did not have much difficulty sitting. Dani reported that Madison would sometimes cry and lie on the floor for prolonged periods of time. This inconsistency in Madison's behavior was one of Dani's major concerns. When the self-monitoring intervention was introduced, Madison' rate of self-monitoring was low or zero.

Percentage of Non-Overlapping Data Metric

For Isaac and Dylan, the PND was calculated by comparing data from the first baseline with the first intervention sessions as recommended by Scruggs et al. (1987, 1998) when using a withdrawal design. Intervention and maintenance data were combined since the intervention phases contained of only three to four data points. The

PND for Isaac was 100% suggesting that the self-monitoring intervention was highly effective for Isaac. The PND for Davis was 90% suggesting that the intervention was also highly effective. For John and Madison, the PND was calculated by comparing baseline and return to baseline data with intervention and maintenance data. The PND for John was 100%, and the PND for Madison was 76.2%. Overall, according to the PND, the self-monitoring interventions were highly effective for 3 participants and effective for 1 participant.

Engagement in Self-Monitoring Behavior

Isaac engaged in self-monitoring behavior 100% of the time during intervention. He self-monitored (independently or with a teacher prompt) every instance of inappropriate sitting. This was due to the fact that the researcher was providing feedback to the teacher to ensure that she prompted Isaac to self-monitor every time he was not sitting appropriately. During maintenance, Isaac engaged in self-monitoring behavior an average of 85.5% (range 50-100%) of the time, either independently or with a teacher prompt. Davis engaged in self-monitoring behavior 100% of the time during intervention. During maintenance when Davis utilized a 1-minute interval to self-monitor, Davis engaged in self-monitoring behavior an average of 98.6% (range 66.7-100%) of 1-minute intervals. When Davis' interval was increased to 1.5, 2, 2.5, and 3 minutes, his percentage of engagement in self-monitoring behavior was 100%. John engaged in self-monitoring behavior 100% of the time during intervention. During maintenance, John engaged in self-monitoring behavior an average of 99% (range 91.7-100%) of the time.

Madison engaged in self-monitoring behavior 100% of the time during intervention and maintenance.

Independent Self-Monitoring

When the self-monitoring intervention was first introduced in the classroom activity, all student participants required prompting to self-monitor. Prompting was faded as the students independently initiated self-monitoring.

Isaac

Isaac was given verbal praise for self-monitoring (e.g., "good job marking on your sheet") only during the first 2 weeks. After this, he no longer received praise when he self-monitored. If Isaac did not self-monitor when he sat inappropriately, he was prompted to do so by a teacher for the first 2 weeks. He then became independent with the system and did not need to be prompted. On a couple of occasions his teacher would prompt him to self-monitor without giving him an opportunity to do so independently, and most of the time, he would not respond to the verbal prompt. Instead, he would wait a couple of seconds and then self-monitor independently.

During baseline, Isaac did not engage in self-monitoring behavior. During intervention, Isaac's average percentage of independent self-monitoring was 6.3% (range 0-25%). During maintenance, Isaac's average percentage of independent self-monitoring was 78.9% (range 57.1-100%). When the self-monitoring intervention was withdrawn, his rate of inappropriate sitting increased, and when the self-monitoring intervention was reintroduced, his rate decreased. After the return to baseline, Isaac's average percentage of independent self-monitoring during maintenance was similar (M=75%; range 0-

100%). These results indicate that the self-monitoring system decreased inappropriate sitting for Isaac. See Figure 9 for Isaac's independent and prompted self-monitoring during baseline, intervention, and maintenance.

Davis

During baseline, Davis did not engage in self-monitoring behavior. During intervention, Davis' average percentage of independent self-monitoring was 11.1% (range 0-22.2%). During maintenance, Davis' average percentage of independent self-monitoring was 41% (range 0-87.5%). After the return to baseline, Davis' percentage of independent self-monitoring utilizing the 1-minute interval was 88.9%. When the interval was increased, the average percentage of independent self-monitoring was 34.6% (range 0-60%) in the 1.5 minute interval, 22.5% (range 20-25%) in the 2.5 minute interval, 62.5% (range 20-100%) in the 2 minute interval, and 74% (range 60-100%) in the 2.5 minute interval. See Figure 9 for Davis' number of occurrences of independent and prompted self-monitoring during baseline, intervention, and maintenance.

John

During baseline, John did not engage in self-monitoring behavior. During intervention, John's average percentage of independent self-monitoring was 54.4% (range 42.8-64.7%). During maintenance John's average percentage of independent self-monitoring increased to 78.7% (range 63.6-100%). Maintenance data were taken over a 3-week period. See Figure 9 for John's number of occurrences of independent and prompted self-monitoring during baseline, intervention, and maintenance.

John's timer was set to one minute, and he pushed the button twice (i.e., once to make the beeping stop and again to reset it). If John did not turn off the timer independently, his teacher instructed him to check his timer. Most of the time, John initiated turning off the timer and self-monitoring. Thus, the prompted self-monitoring instances mostly reflect times when John self-monitored incorrectly.

John was initially taught to self-monitor using momentary time sampling (i.e., identifying if he was sitting appropriately when the timer beeped). When his teacher changed to whole interval recording (i.e., identifying if he was sitting appropriately during the entire interval), he sometimes needed to be prompted to correctly identify that he was not sitting during the entire interval since he sometimes self-monitored with momentary time sampling instead of whole interval.

Madison

During baseline, Madison did not engage in self-monitoring behavior. During intervention, Madison only had one opportunity to self-monitor on 1 of the 4 days. On this day, Dani prompted her to self-monitor. Thus, Madison's percentage of independent self-monitoring was 0% during intervention. Maintenance data were taken over a 2-week period, and a similar situation occurred during maintenance. Madison only had one to two opportunities to self-monitor on 2 of the 8 days. During both of these days, Madison percentage of independent self-monitoring was 0%. See Figure 9 for Madison's number of occurrences of independent and prompted self-monitoring during baseline, intervention, and maintenance.

Generalization of Teacher's Use of Self-Monitoring Across Activities, Behavior, and Students

Two teachers, Beatriz and Lizette, generalized the self-monitoring intervention to another activity with the same student. Beatriz requested the assistance of the researcher to implement the intervention in another activity with Isaac. Lizette implemented the self-monitoring intervention with Davis during another classroom activity. Rate of inappropriate sitting decreased when self-monitoring was introduced in the generalization activity for both Isaac and John. In addition, Beatriz generalized the use of the self-monitoring intervention to another behavior with Isaac, sitting on the floor. Beatriz also requested assistance to develop and train another student in her classroom to use a self-monitoring intervention for following instructions. The other three teachers did not developed self-monitoring interventions for other students in their classroom.

Generalization Across Activities, Behavior, and Students for Beatriz

Generalization Across Activities for Beatriz

After 5 days of utilizing the self-monitoring system in Circle Time, Beatriz utilized the self-monitoring intervention with Andrew in the generalization activity, Table Activity. Beatriz had Isaac utilize the self-monitoring intervention on the last day before the holiday break. After the holiday break, Beatriz no longer made the self-monitoring system available to Andrew during Table Activity. Data were not taken every day in the generalization activity, so it is possible that Beatriz had Isaac utilize the self-monitoring intervention for more than one day. When the researcher asked Beatriz about Isaac's use of the self-monitoring system during Table Activity, she reported that she wanted Isaac to

learn how to use the self-monitoring intervention very well during Circle Time before using it during any other activity.

Five months after Beatriz provided Isaac with the self-monitoring system once during Table Activity, Beatriz told that researcher that Isaac was having a hard time sitting during Table Activity and requested the researcher's assistance in implement the self-monitoring intervention during Table Activity. Beatriz reported that she had tried to use the system during other activities with Isaac but that it has not worked as well as during Circle Time. The researcher provided the teacher and supporting teacher with feedback on using the self-monitoring intervention during the next Table Activity.

Students sat around the table during Table Activity, unlike Circle Time where the students sat in a semi-circle on the floor or in a chair facing the teacher. Beatriz's supporting teacher suggested adding "chair flat" to the self-monitoring intervention for Table Activity since keeping the chair flat on the floor was Isaac's main difficulty during this time. Beatriz had introduced the phrase "chair flat" along with a written visual cue on the table in front of each student's chair 2 weeks prior to implementing the self-monitoring intervention during Table Activity. Isaac was verbally told while the teacher pointed to the new visual cue on his self-monitoring sheet that sitting appropriately in Table Activity also meant he had to keep his chair flat.

The researcher recommended putting a piece of Velcro® on the table where the clipboard could be placed so that it would stay in place since various handouts and visuals were utilized during this activity. When the self-monitoring intervention was first introduced during Table Activity, Isaac's rate of inappropriate sitting decreased

immediately. See Figure 11 for Isaac's rate per minute of inappropriate sitting in the generalization activity.

Isaac's average rate per minute of inappropriate sitting was 1.3 (range .55-2) during Table Activity. When the teacher introduced the self-monitoring intervention one day during baseline, his rate decreased to .1. Isaac required prompting to self-monitor during Table Activity. At this time, Andrew's self-monitoring system only tracked inappropriate sitting. Since Andrew only sat inappropriate one time, he only had one opportunity to self-monitor. The next time that the researcher collected probe data during Table Activity, Beatriz no longer made the self-monitoring material available to Isaac. His average rate of inappropriate sitting increased again to 1.35 (range .55-2) times per minute. Once the self-monitoring intervention was re-introduced, Isaac's average rate per minute of inappropriate sitting decreased to .14 (range 0-.36). Isaac engaged in self-monitoring behavior 85.4% (range 66.7-100%) of the time during intervention. During maintenance, Isaac engaged in self-monitoring behavior an average of 97.2% (range 94.1-100%) of the time. On average, Isaac self-monitored independently 7.9 (range 2-20) times per session and required prompting .5 (range 0-2) times per session. Figure 11 for Isaac's number of occurrences of independent and prompted self-monitoring. Average percentage of independent self-monitoring was 83.1% (range 0-100%). The PND for Isaac was 100% suggesting that the self-monitoring intervention was highly effective for Isaac during Table Activity.

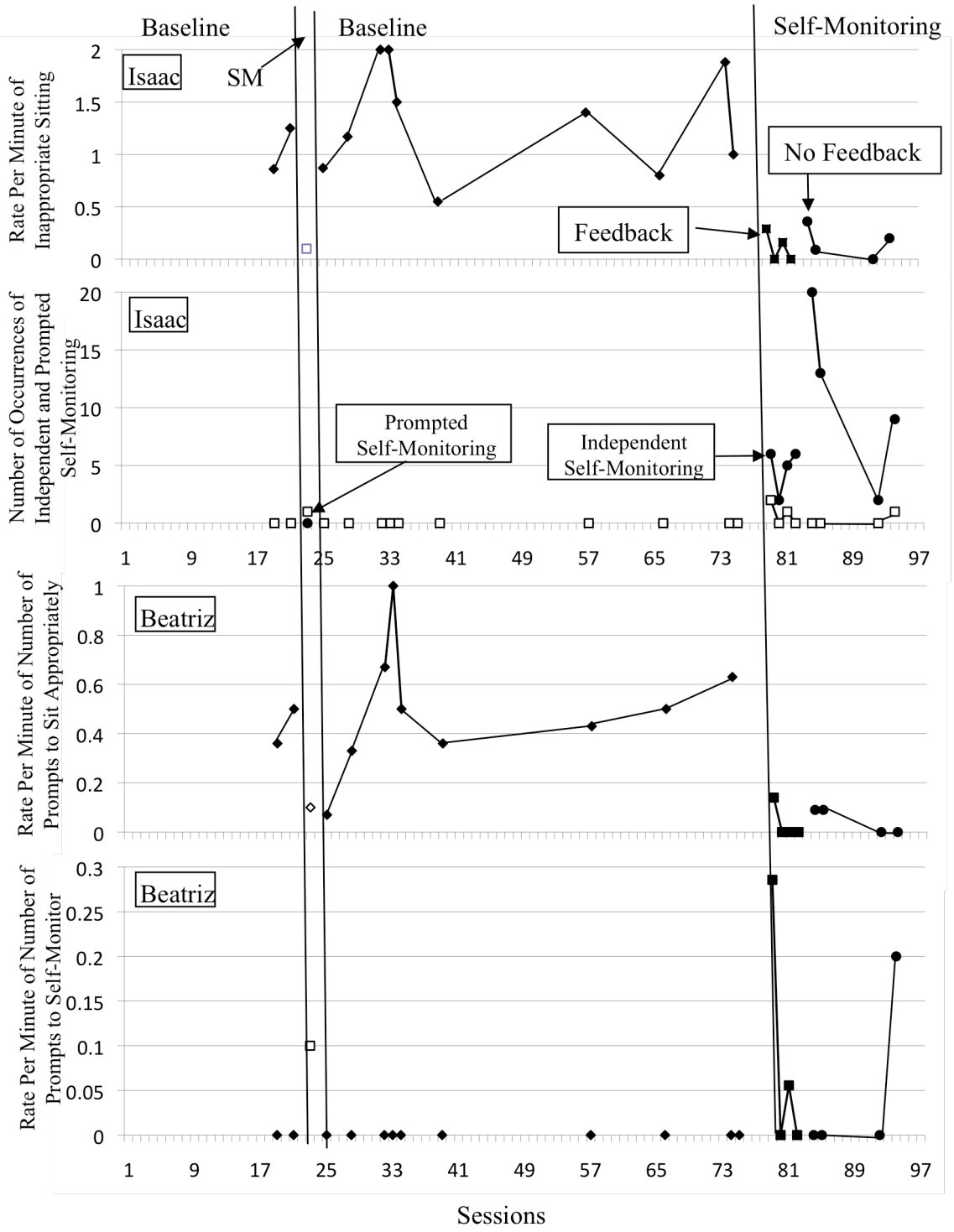


Figure 11. Isaac's rate per minute of inappropriate sitting, Isaac's number of occurrences of independent and prompted self-monitoring, Beatriz's rate per minute of number of promptes to sit appropriately, and Beatriz's rate per minute of number of prompts to self-monitor in the generalization activity (Table Activity).

When Isaac began to self-monitor following directions as well as inappropriate sitting, he earned two stickers. One sticker he put on the side where he self-monitored following directions and the other sticker he put on the side where he self-monitored inappropriate sitting. Isaac earned his sticker 100% of the time during Table Activity.

Table 22 shows the results for Beatriz's target behaviors in the generalization activity. Beatriz made the self-monitoring material available to Isaac 100% of the time. Average prompts to engage in the target behavior decreased from baseline to intervention and maintenance. The prompts to self-monitor averaged .07 times per minute during intervention and maintenance. Beatriz adhered to the consequence schedule with 100% accuracy during intervention and maintenance. See Figure 11 for Beatriz's rate per minute of number of prompts to sit appropriately and rate per minute of number of prompts to self-monitor in the generalization activity.

Table 22. Generalization activity results for Beatriz.

	Amount of Time that Self-Monitoring Material was Available	Prompts to Engage in the Target Behavior	Prompts to Self-Monitor	Adherence to the Consequence Schedule
Baseline Average (Range)	0%	.45 (.07-1)		
Intervention Average (Range)	100%	.04 (0-.14)	.09 (.06-.29)	100%
Maintenance Average (Range)	100%	0.09	.05 (0-.2)	100%

Note. Prompts to engage in the target behavior and prompts to self-monitor reflect an average per minute.

Generalization Across Behavior for Beatriz

Two days after the return to baseline phase, Isaac said, "sit on the floor" during Circle Time. During 4 of the next 5 days, Isaac requested to sit on the floor and Beatriz allowed him to do so. Then, the researcher and Beatriz spoke about the need to either have Isaac sit in his chair again or teach him the expectations for sitting on the floor. Beatriz believed that Isaac needed to be more successful with sitting in his chair before moving on to sitting on the floor.

Three months later, Beatriz decided that Isaac was ready to sit on the floor instead of sitting in his chair during Circle Time since his rate of inappropriate sitting and independence with the self-monitoring system were acceptable to her. She spoke to the researcher about having Isaac self-monitor sitting on the floor, and the researcher assisted her in coming up with key phrases that were used to teach Isaac how he needed to behave to sit appropriately on the floor. Beatriz told Isaac he had to have his bottom touching the floor, not lay on the floor, not stomp his feet, and back not touching the floor. His self-monitoring sheet was also changed to say "NOT sitting on the floor" instead of "NOT sitting in my chair". The operational definition of sitting on the floor was Isaac sits on the floor with his bottom touching the carpet, back not touching the carpet (i.e., no laying), and no and more than two continuous strums of feet on the floor (i.e., no stomping).

Figure 12 shows Isaac's self-monitoring system for sitting on the floor. For the remainder of the school year, Isaac was encouraged to sit on the floor. This was the reason that why only two maintenance points were taken during the latter part of the maintenance phase.

Following Directions

If I follow directions, I will put a "v".

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30

NOT Sitting on the Floor

If I stand up without raising my hand, I will put an "X".

1	2	3	4	5
6	7	8	9	10

Bottom on Floor
No Laying

If I follow directions 20 or more times **AND**
If I get up without raising my hand 5 or less times, I will get a sticker.

Figure 12. Isaac's self-monitoring sheet for not sitting on the floor and following direction.

Teacher behaviors. Beatriz provided Isaac with the self-monitoring material 100% of the time when Isaac self-monitored sitting on the floor. The rate of teacher reminders to sit appropriately (e.g., "you need to have your bottom on the chair") or not sit inappropriately (e.g., "don't stomp your feet") during intervention and maintenance when Isaac self-monitored sitting in his chair (range .12-.18) were similar to the rate of reminders when Isaac sat on the floor (M=.11; range 0-.31). The average rate per minute of teacher prompts to self-monitor was also similar when Isaac self-monitored sitting in his chair (range .07-.10) and when he self-monitored sitting on the floor (M=.04; range 0-.27). Beatriz's adherence to the consequence schedule was 100%. During the generalization phase, Isaac earned his sticker 96.3% of the time. See Table 22 for specific information on teacher behavior when Isaac self-monitored sitting on the floor. Treatment fidelity was calculated for 100% of sessions when Isaac self-monitored sitting on the

floor. The average percent of treatment fidelity was 96.7% (range 66.7-100%). Interobserver agreement was calculated for 33.3% of sessions and averaged 100%.

Student behaviors. See Figure 13 for Isaac's rate per minute of inappropriate sitting and number of occurrences of independent and prompted self-monitoring when sitting on the floor. When Isaac self-monitored inappropriate sitting on the floor, his average rate per minute of inappropriate sitting was .1 (range 0-.25) during intervention and .16 (range 0-.31) during maintenance. His rate of inappropriate sitting on the floor was lower than his rate of inappropriate sitting in his chair.

Unlike the rate of engagement in self-monitoring behavior of inappropriate sitting in his chair, which was 100%, Isaac engaged in self-monitoring behavior of inappropriate sitting on the floor an average of 87.5% (range 50-100%) of the time during intervention. Teachers were not expected to prompt the student to self-monitor since Isaac already knew how to use the self-monitoring system. During the self-monitoring training, teachers were told to prompt students during the first few sessions and then allow the students to independently self-monitor. It was left to the teacher's discretion to decide when to stop prompting the student. Thus, feedback was not given about prompting Isaac to self-monitor during the intervention phase of inappropriate sitting on the floor. During maintenance, Isaac engaged in self-monitoring behavior an average of 95.7% (range 75-100%) of the time. Isaac's percentage of independent self-monitoring was 71.4% (range 33.3-100%) when the researcher provided feedback (i.e., intervention) and 84.3% (range 20-100%) when the researcher did not provide feedback (i.e., maintenance). Isaac earned his sticker 100% of the time when self-monitoring sitting on the floor.

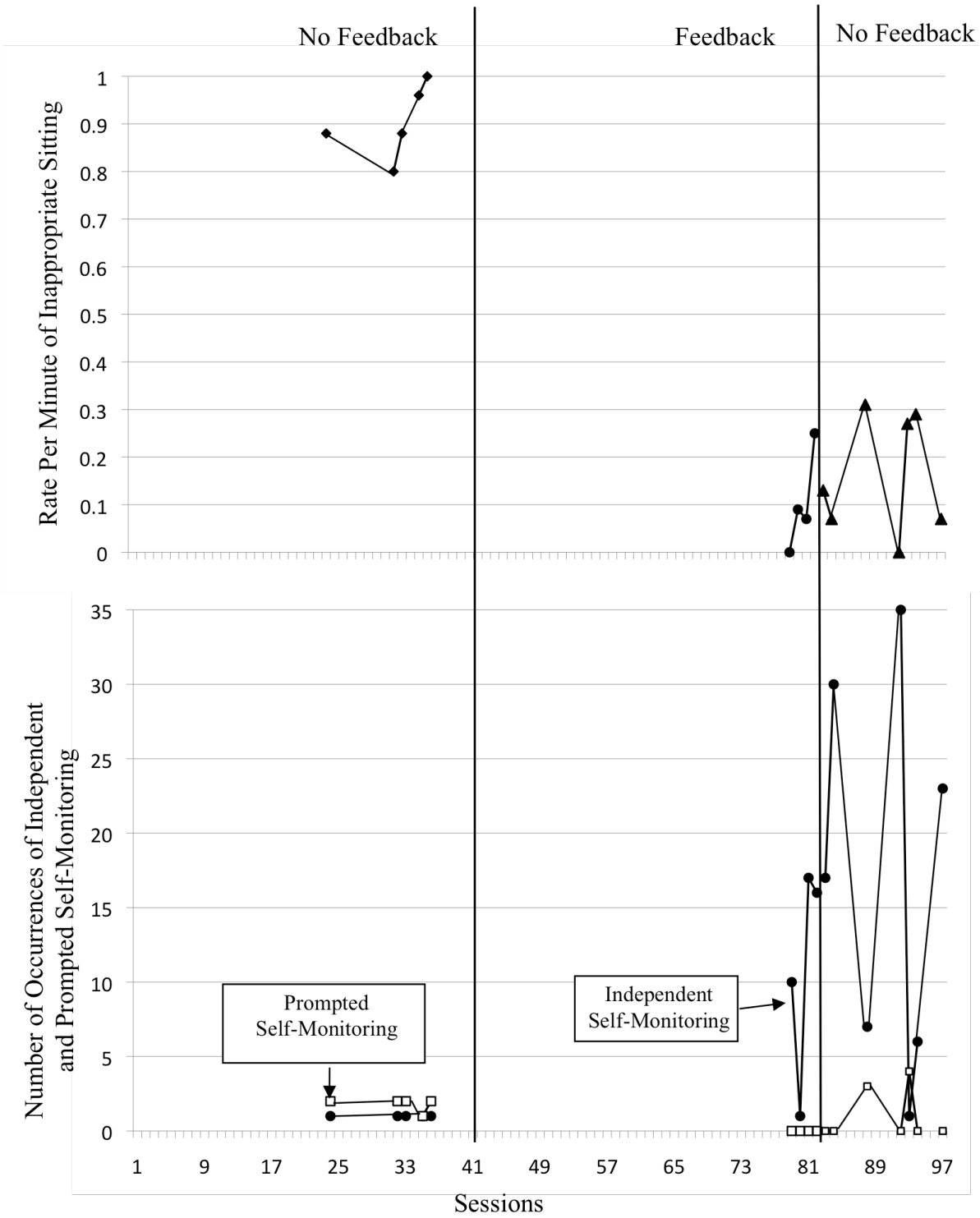


Figure 13. Isaac's rate per minute of inappropriate sitting and number of occurrences of independent and prompted self-monitoring when generalized to sitting on the floor.

Generalization Across Students for Beatriz

The first day after the self-monitoring intervention was implemented in the classroom with Isaac, Beatriz asked the researcher to meet with her to develop a self-monitoring system for the other student. The teacher did not request assistance during the self-monitoring training. The researcher observed the student throwing the self-monitoring material and not independently self-monitoring. Beatriz's supporting teacher was having to not only prompt him to self-monitor, but self-monitor for him to prevent the self-monitoring material from being tossed. The researcher suggested having a self-monitoring training session like she had with Isaac and offered to be present. Beatriz told the researcher that she would plan to have the self-monitoring training, but the training never took place. After a couple of weeks of attempting to teach the student to self-monitor during Circle Time, the intervention was abandoned.

Generalization Across Activities for Lizette

Lizette generalized the use of the self-monitoring intervention with John to Reading after 9 days of using the self-monitoring intervention during Math. She invited the researcher to come during Reading to see John's behavior. Data in the generalization activity, Reading, was collected for only 4 days for Lizette/John since John withdrew from the school. See Figure 14 for John's rate per minute of inappropriate sitting and number of occurrences of independent and prompted self-monitoring in the generalization activity.

John's average rate per minute of inappropriate sitting during baseline Reading was 1.34 (range .88-1.85). When the self-monitoring intervention was implemented, his

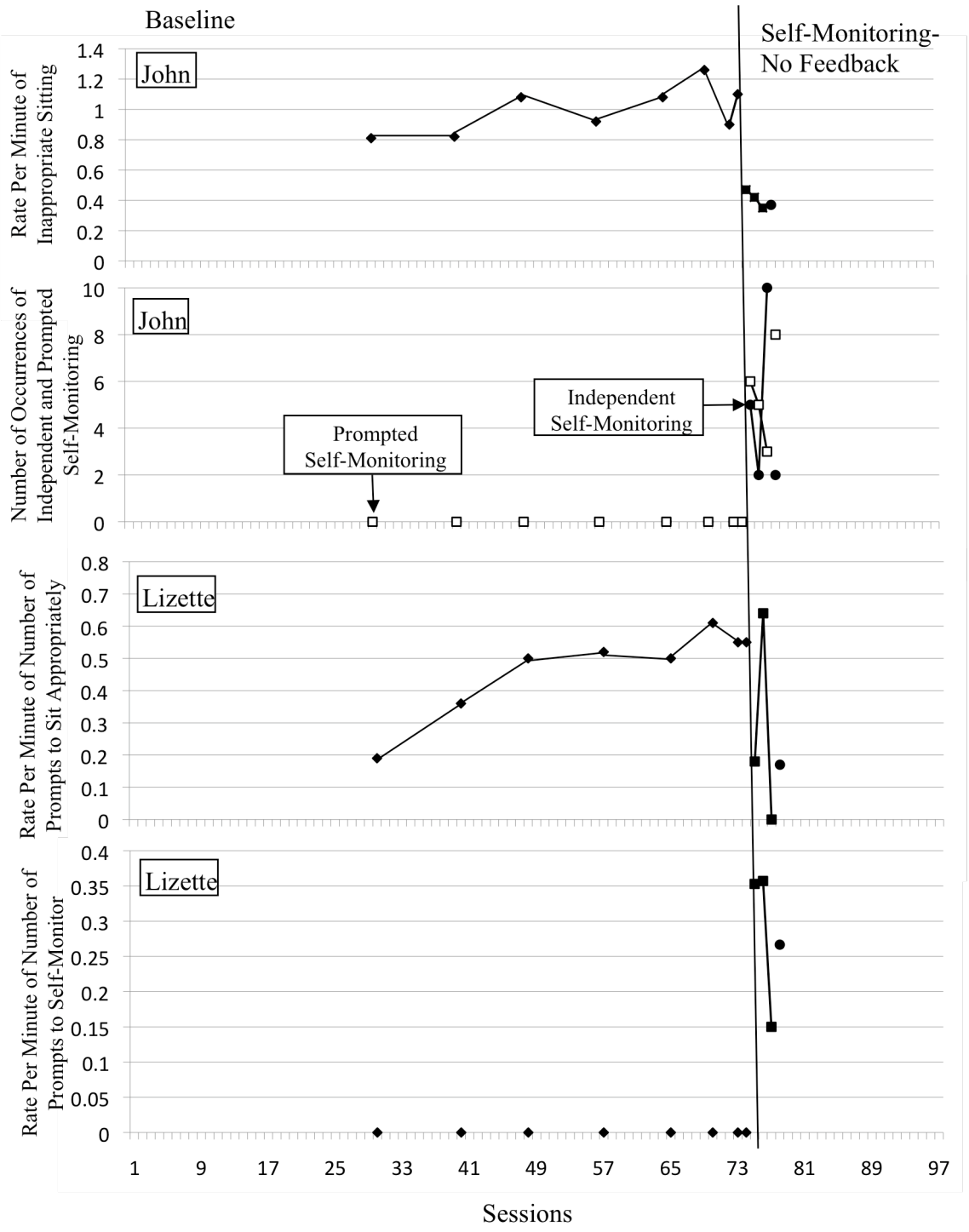


Figure 14. John's rate per minute of inappropriate sitting, John's number of occurrences of independent and prompted self-monitoring, Lizette's rate per minute of number of prompts to sit appropriately, and Lizette's rate per minute of number of prompts to self-monitor in the generalization activity (Reading).

rate per minute of inappropriate sitting decreased to an average of .45 (rate .17-.75). The PND for John was 100% suggesting that the self-monitoring intervention was highly effective for John during Reading. John engaged in self-monitoring behavior an average of 98.2% (range 92.9-100%) of the time during intervention. John self-monitored independently and correctly an average of 4.75 (range 2-10) times and required prompting to correctly self-monitor an average of 5.5 times (range 3-8). Average percentage of independent self-monitoring was 42.7% (range 20-76.9%). During the intervention phase of Reading (i.e., the first 4 days), John's independent self-monitoring was also low (M=54.4%) but increased during the maintenance phase (M=78.7%). John earned his sticker 75% of the time during Reading.

Table 23 shows the results for Lizette in the generalization activity. Lizette made the self-monitoring material available to John 100% of the time. Average prompts to engage in the target behavior decreased from baseline to intervention and maintenance. The prompts to self-monitor averaged .29 times per minute. Lizette provided John with reinforcement based on the contingency with 100% accuracy. See Figure 14 for Lizette's rate per minute of number of prompts to sit appropriately and rate per minute of number of prompts to self-monitor in the generalization activity.

Treatment Fidelity

In the generalization activity, treatment fidelity data were calculated for Beatriz and Lizette for 100% of sessions, and the average treatment fidelity was calculated to be 99.8% (range 99.6-100%). Data are reported only for Beatriz/Isaac and Lizette/John since they generalized the use of the self-monitoring intervention to another activity, student,

and/or behavior. Interobserver agreement on treatment fidelity was conducted for an average of 41.7% (range 33.3-50%) of sessions and calculated to be 100%. See Table 24 for specific data on treatment fidelity and interobserver agreement for treatment fidelity in the generalization activity for Beatriz and Lizette.

Table 23. Generalization activity results for Lizette.

	Amount of Time that Self-Monitoring Material was Available	Prompts to Engage in the Target Behavior	Prompts to Self-Monitor	Adherence to the Consequence Schedule
Baseline Average (Range)	0%	.47 (.19-.61)		
Intervention Average (Range)	100%	.27 (0-.64)	.29 (.15-.36)	100%
Maintenance Average (Range)	100%	.17	.29	100%

Note. Prompts to engage in the target behavior and prompts to self-monitor reflect an average per minute.

Table 24. Treatment fidelity and interobserver agreement for treatment fidelity in the generalization activity for Beatriz and Lizette.

	Beatriz	Lizette
% of session for which Treatment Fidelity was Calculated	100%	100%
Treatment Fidelity	99.6%	100%
Treatment Fidelity Range	96.7-100%	
% of Sessions with IOA	33.3%	50%
Average IOA	100%	100%

Social Validity

Social validity was measured is several ways. First, social validity was measured by determining whether teachers generalized the use of the self-monitoring intervention to other classroom activities without additional training or guidance from the researcher or by requesting assistance from the researcher. Second, social validity was assessed by

asking teachers a series of questions related to their use of self-monitoring strategies with students in their classroom and their beliefs regarding whether a self-monitoring intervention would benefit their students. Social validity was further assessed by comparing the number of students who were using a self-monitoring system prior to the study to the number of students who were using a self-monitoring system by the end of the study. In addition, the number of students that the teacher believed would benefit from a self-monitoring intervention at the beginning of the study was compared to the number of students that the teacher believed would benefit from a self-monitoring intervention at the end of the study. Social validity results are discussed below for each teacher and student participant dyad.

Social Validity for Beatriz/Isaac

Generalization data for Isaac showed that Beatriz requested further support from the researcher to implement the self-monitoring intervention with Isaac during another activity, Table Activity. Beatriz also requested support to implement a self-monitoring intervention with another student.

Isaac's mother asked if she could also receive the training so that she could learn how to modify the self-monitoring intervention and utilize it at home as well as provide Isaac's future teachers with the information. The researcher provided Isaac's mother with the self-monitoring training.

Prior to Beatriz receiving the self-monitoring training, she reported that she believed two of her students would benefit from the self-monitoring intervention. Using the 5-point Likert scale, with 1 = *disagree*, 2 = *somewhat disagree*, 3 = *neither agree nor*

disagree, 4 = *somewhat agree*, and 5 = *agree,* Beatriz reported that she agreed (i.e., a score of 5) with the following statement for both students: I believe that the student would benefit from the use of a self-monitoring intervention. At the end of the study, when she was asked to use the same 5-point Likert scale to answer the following statement about Isaac, "I believe that the student has benefited from the self-monitoring intervention", she answered 5, agree. When Beatriz was asked if she had utilized a self-monitoring intervention with another student she reported having tried with one student, and when asked to rate the same question with the 5-point Likert scale for this student she reported 4, somewhat agree. At the end of the study when asked how many other students she believed would benefit from the self-monitoring intervention in her classroom she said 4 others (i.e., the rest of the class), and she rated a 5, agree, when asked to rate the statement, "I believe that the student would benefit from the use of a self-monitoring intervention."

Social Validity for Anna/Davis

Anna did not generalize Davis' self-monitoring intervention to another activity, behavior, or student. She did, however, begin to fade the self-monitoring system by increasing the length of the interval that Davis used to self-monitor and, thus, thinned the schedule of reinforcement. Anna reported that she wanted Davis to be able to monitor his behavior using larger intervals before using the system during another activity. When the school closed, Anna was still increasing the interval.

Prior to Anna receiving the self-monitoring training, she reported that she believed Davis was the only student who would benefit from the self-monitoring

intervention. Using the 5-point Likert scale previously mentioned, Anna reported that she agreed with the following statement for Davis: "I believe that the student would benefit from the use of a self-monitoring intervention." At the end of the study, when she was asked to use the same 5-point Likert scale to answer the following statement about Davis, "I believe that the student has benefited from the self-monitoring intervention", she answered 5, agree. When Anna was asked if she had utilized a self-monitoring intervention with another student she reported she had not. When asked how many other students she believed would benefit from the self-monitoring intervention in her classroom she said that if she modified the system, they all would. Anna rated a 5, agree, when asked to rate the statement, "I believe that the student would benefit from the use of a self-monitoring intervention," for all other students in her classroom.

Social Validity for Lizette/John

Lizette generalized the use of the self-monitoring intervention to another activity, Reading. Prior to Lizette receiving the self-monitoring training, she reported that she believed two of her students would benefit from the self-monitoring intervention. Using the previously mentioned 5-point Likert scale, Lizette reported that she somewhat agreed (i.e., a score of 4) with the following statement for both students: "I believe that the student would benefit from the use of a self-monitoring intervention." At the end of the study, when she was asked to use the same 5-point Likert scale to answer the following statement about John, "I believe that the student has benefited from the self-monitoring intervention", she answered 4, somewhat agree.

Lizette did not generalize the use of self-monitoring to other students. When asked how many other students she believed would benefit from the self-monitoring intervention in her classroom said 1. Lizette rated a 4, somewhat agree, when asked to rate the statement, "I believe that the student would benefit from the use of a self-monitoring intervention," for the other student in her classroom. When she was asked to report on the effectiveness of the intervention at the end of the study, she reported that she believed the intervention was only somewhat effective.

Social Validity for Dani/Madison

Dani did not generalize the use of self-monitoring to another class activity, another behavior, or another student. Prior to Dani receiving the self-monitoring training, she reported that she believed two of her students would benefit from the self-monitoring intervention. Using the 5-point Likert scale, Beatriz reported that she agreed with the following statement for both students: I believe that the student would benefit from the use of a self-monitoring intervention." At the end of the study, when she was asked to use the same 5-point Likert scale to answer the following statement about Madison, "I believe that the student has benefited from the self-monitoring intervention", she answered 5, agree. When asked how many other students she believed would benefit from the self-monitoring intervention in her classroom Dani said two other students would, and she rated a 5, agree, when asked to rate the statement, "I believe that the student would benefit from the use of a self-monitoring intervention."

CHAPTER 5

DISCUSSION

The purpose of this dissertation study was to examine the effects of a self-monitoring treatment package on both teacher and student behavior in the classroom. Each research questions that was addressed by this dissertation and was listed at the end of Chapter 2 is discussed and includes ways in which this study adds to the current literature. Finally, limitations of the study, future research, and a summary are presented.

What are the Effects on Teacher Behavior of a Self-Monitoring Treatment Package?

After receiving the self-monitoring training, feedback on the self-monitoring training system they developed for their student, and feedback during the student self-monitoring training, teachers required very little to no feedback to implement the self-monitoring system with fidelity in the classroom. The researcher did not need to provide feedback to 2 teachers when the self-monitoring intervention was first implemented in the classroom since they independently implemented the self-monitoring intervention with fidelity. For the other 2 teachers, the researcher provided feedback only during the first session.

All teachers made the self-monitoring material available to the students 100% of the time in all sessions. Teachers prompted the students to self-monitor as needed. The rate per minute of teacher prompts to engage in the target behavior decreased from baseline to intervention, and teachers' adhered to the consequence schedule was high.

Overall, teachers implemented the self-monitoring systems with high fidelity during intervention.

Feedback to Teachers

Data on the amount of feedback provided during the student self-monitoring training was not systematically measured. It was noted anecdotally that teachers initially needed more feedback during the student self-monitoring training and later required little to no feedback. In fact, two teachers (i.e., Lizette and Dani) decided to do their third student-training session without the researcher present and didn't notify the researcher until after the fact. This suggests that they did not feel it was necessary to have the researcher present during these sessions.

Contribution to Current Literature

Teachers as Interventions Agents

Seventy one percent of previous self-monitoring research (e.g., Coyle & Cole, 2004; Morrison et al., 2001; Newman et al., 2000) on people with developmental disabilities used researchers as the intervention agents. This research contributes to the self-monitoring literature by utilizing teachers who are typical intervention agents to implement self-monitoring interventions. This research utilized a multiple probe design, which controls for extraneous variables, and the data suggests the changes in teacher behavior were due to the self-monitoring treatment package.

Staff Training Literature

This research also contributes to the staff training literature because it provides an evaluation of a treatment package for self-monitoring that the teachers in this study

appeared to be able to implement with little training and minimal feedback. According to Sturmey (2008), the use of Behavioral Skills Training (BST) procedures as a method to teach skills to staff working with children with autism spectrum disorders is best practice. BST procedures have been used to train staff in applied behavior analysis and consist of instruction, modeling, rehearsal, and feedback (Miltenberger, 2008). Various studies have looked at the effectiveness of utilizing the BST. These studies have utilized BST procedures to train staff to assess and treat challenging behavior (Iwata et al., 2000; Moore, Edwards, Sterling-Turner, Riley, DuBard, McGeorge, 2002), conduct analogue baselines (Wallace, Doney, Mintz-Resudek, & Tarbox, 2004), embed teaching in the natural routine (Schepis, Reid, Ownbey, & Parson, 2001), perform stimulus preference assessments (Lavie & Sturmey, 2002; Roscoe, Fisher, Glover, & Volkmet, 2006), and utilize various behavior skills (e.g., discrete trial training, stimulus preference assessments; Lerman, Vorndran, Addison, & Kuhn, 2004).

One of the most commonly used procedures in staff training is performance feedback (Alvero, Bucklin, & Austin, 2001), a component of BST procedures. Past research in teacher training in the area of developmental disabilities has suggested that performance feedback can be effective for training teachers to implement a variety of skills, including positive consequences and instructional prompts (O'Reilly et al., 1992), functional analysis (Machalicek et al., in press a), preference assessments (Machalicek et al., in press b), and assessment of challenging behavior (Machalicek et al., in press c).

Only a few studies have been conducted on the effective components or variations in the procedures of BST (Sturmey, 2008). The self-monitoring treatment package used

in this study included some of the components utilized in BST procedures (i.e., instruction, rehearsal, and feedback). Given that teachers with various types of educational training and experience participated in this study, the first component of the self-monitoring treatment package aimed at ensuring that all teachers had the same knowledge about self-monitoring and defining terminology. Feedback was then provided to teachers on the self-monitoring intervention they developed, during the student self-monitoring training, and finally while they implemented the self-monitoring intervention in the classroom if they did not implement the system with fidelity.

According to Lang and Fox (2003), continuing education needs to consists not only of passive methods of distributing information, such as lectures and workshops, but also of more interactive activities based on the needs of the participants. The self-monitoring treatment package utilized in this study adheres to Lang and Fox's recommendations. The self-monitoring treatment package was successful at training teachers to develop and implement self-monitoring systems with fidelity, and it can be concluded that this resulted in positive effects on student behavior since a multiple probe design that controls for maturation and extraneous variables was utilized. These results indicate that self-monitoring treatment package used to train teachers to self-monitor was effective.

What are the Effects on Student Behavior of a Self-Monitoring Treatment Package?

Rate of inappropriate sitting decreased for all participants when the self-monitoring intervention was implemented. The PND values indicate that the self-

monitoring interventions were highly effective for 3 participants and effective for 1 participant. The multiple probe design and the reversal conducted for two of the participants' shows that the changes in student behavior were due to the self-monitoring intervention and not to a general improvement in student behavior.

Students engaged in self-monitoring behavior (independently or with teacher prompt) 100% of the time during the intervention phase. Rates of independent self-monitoring were low during the intervention phase for 3 of the 4 student participants (i.e., Isaac, Davis, and Dani), and the other student participant's (i.e., John) score was about 50%. During intervention, students earned their reinforcer between 33.3 and 100% of the time. Although the average percentage of times that student's earned their reinforcement varied, the effects of the self-monitoring intervention on student's rate of inappropriate sitting were comparable.

Contribution to Current Literature

Natural Settings

Previous studies on self-monitoring suggest that a variety of skills can be addressed with self-monitoring, including play skills (e.g., Newman et al., 2002), social skills (e.g., Morrison et al., 2001), and work/academic skills (e.g., Mace et al., 1986). However, the review in Chapter 2 suggested that more work needs to be done to determine the effectiveness of using self-monitoring in natural settings given the results of previous research. In addition, the one research study (i.e., Strain et al., 1994) that used typical intervention agents to train children younger than 8 years of age to use self-monitoring interventions was conducted in a separate room not in a natural setting. This

study contributes to the self-monitoring literature by implementing self-monitoring interventions in natural settings (i.e., classrooms). In this study, the multiple probe design and the reversal conducted for 2 of the 4 participants showed that self-monitoring interventions were effective at decreasing students' rate of inappropriate sitting when they were implemented in the classroom.

Impact of the Trainer

This study also enables a better understand of the impact of the trainer on the participant's behavior. Results of a comprehensive review found that the average PND for the studies in which teachers delivered the intervention (i.e., Hughes & Boyle, 1991; Martella et al., 1993) fell in the questionable range (M = 63%), whereas the studies in which a researcher delivered the intervention had average PND values in the effective range (M = 89%). In this study, the PND values were in the highly effective range (i.e., range 90-100%) for 3 student participants (i.e., Isaac, Davis, John) and in the effective range (i.e., 76.25%) for 1 participant (i.e., Madison).

One reason for better student outcomes found in this study as compared to previous studies that used teachers as the intervention agent is that in addition to being trained on how to implement self-monitoring interventions, teachers were trained on how to develop self-monitoring interventions. This study extends previous research by not only examining whether teachers can implement self-monitoring systems, but also investigated whether they can develop self-monitoring systems for their students through a self-monitoring treatment package. Being actively involved in learning is an important aspect of learning (National Research Council, 2001). As such, giving teachers the

opportunity to develop a self-monitoring system while receiving feedback may be a reason why the self-monitoring interventions were more effective for student who participated in this study.

Evaluation of Treatment Fidelity

Seventy one percent of previous self-monitoring research on people with developmental disabilities did not assess treatment fidelity. The PND for these studies suggest that the interventions were effective; however, replication was needed due to the lack of treatment fidelity. None of the four previous studies (i.e., Gilberts et al., 2001; Hughes & Boyle, 1991; Martella et al., 1993; Strain et al., 1994) that used typical intervention agents assessed treatment fidelity. This study also contributes to the self-monitoring literature since treatment fidelity was assessed. Teachers implemented the self-monitoring interventions with fidelity, and as such, we can be more confident that the changes seen in students' behavior are a result of the self-monitoring system implemented by the teachers (Kennedy, 2005). Furthermore, the multiple probe design with a reversal for 2 of the 4 participants used in this study infers that the changes in student behavior were due to the self-monitoring intervention.

Low treatment fidelity by teachers may be another reason for the discrepancy in the effectiveness of self-monitoring interventions when implemented by researchers versus when implemented by teachers found in previous self-monitoring research. For example, Martella et al. (1993) reported positive results in decreasing negative statements but the PND value indicated that the intervention was not effective. During the first part of the intervention, there was significant overlap between baseline and intervention data.

Treatment fidelity was not assessed so it possible that the overlap may have been due to low treatment fidelity. As such, it is possible that compared to previous self-monitoring research that utilized teachers to implement self-monitoring interventions better results were obtained in the present study when teachers implemented the self-monitoring intervention due to the self-monitoring treatment package. The self-monitoring treatment package enabled teacher to implement the self-monitoring interventions with fidelity, which may be the reasons for better student outcomes.

To What Extent do Teachers Maintain the Self-Monitoring Skills Taught Via the Self-Monitoring Treatment Package?

Maintenance data were collected for all participants, although the length of the maintenance data varied according to when the self-monitoring intervention was introduced. Maintenance data were taken over a 5-month period for Beatriz/Isaac, over a 3-month period for Anna/Davis, over a 3-week period for Lizette/John, and over a 2-week period for Dani/Madison.

All teachers continued to provide the self-monitoring system to the students in the maintenance phase, and teacher's adherence to the consequence schedule remained high. The number of prompts to engage in the target behavior decreased from baseline to intervention and remained about the same during maintenance. On the other hand, the rate per minute of teacher prompts to self-monitor decreased from intervention to maintenance. This probably occurred because as students had more practice with the self-monitoring system, they were independently self-monitoring more often; hence the teachers did not need to prompt them to self-monitor. It was noted that on a few

occasions teachers would prompt the students to self-monitor before giving them an opportunity to do so on their own when they were very concerned with their behavior. For example, on a few occasions Isaac would get up without asking for permission. His teacher asked him to sit down and if he didn't follow her verbal instruction, she would physically guide him to his chair and would immediately prompt him to self-monitor.

Teachers did not require feedback from the researcher to continue to implement the self-monitoring intervention at any time after the intervention phase when researcher feedback was withdrawn. Treatment fidelity continued to be high throughout the maintenance phase. The results of this study indicate that through the use of a self-monitoring treatment package, teachers were able to develop and implement self-monitoring intervention for their students, and they maintained the skills learned through the self-monitoring treatment package.

Contribution to Current Literature

Previous studies on self-monitoring have focused only on student behavior and not teacher behavior (e.g., Ganz & Sigafoos, 2005; Mace et al., 1986; Misra, 1992). This study contributes to the self-monitoring literature since teachers' ability to maintain the use of self-monitoring interventions for students in their classroom was assessed. In this study, all teachers were able to maintain the skills learned through the self-monitoring treatment package without researcher feedback. This research utilized a multiple probe design, which shows that the changes in teacher behavior were due to the self-monitoring treatment package.

To What Extent do Students Maintain the Skills Targeted in Self-Monitoring Interventions Developed and Implemented by Their Teachers?

Rate of inappropriate sitting continue to be low throughout the maintenance phase. During the maintenance phase, students engaged in self-monitoring behavior an average of 85% of the time. When a reversal condition was conducted for two participants, their rates of inappropriate sitting increased to levels similar to those in the initial baseline phase. After the self-monitoring intervention was re-introduced in the classroom, rate of inappropriate sitting decreased again to levels similar to those when the self-monitoring system was first introduced. Regardless of whether the researcher provided feedback, the teachers were implementing the self-monitoring system with fidelity. Hence, the impact of the self-monitoring system on students' behavior was the same.

Rates of independent self-monitoring were low during the intervention phase for 3 of the 4 student participants (i.e., Isaac, Davis, and Dani), and the other student participant's (i.e., John) score was about 50%. During maintenance, the rate of independent self-monitoring increased for the first 3 participants. The fourth participant (i.e., Madison) did not learn to independently self-monitor. Maintenance data for Madison were only collected for 2 weeks, and she only had only a few opportunities to self-monitor since she sat appropriately most of the time during intervention.

Students maintained their ability to self-monitor even after not attending school for up to two and half weeks. Three students maintained their ability to self-monitor and low rates of inappropriate sitting after the week-long Spring Break, and one of those

students also maintained his skills and low rates of inappropriate sitting after the two and a half week Holiday break. The results of this study indicate that young children with autism can learn to self-monitor their behavior in order to decreases inappropriate behavior and increase appropriate behavior in the classroom, and that their ability to self-monitor is maintained with very little teacher assistance.

Contribution to Current Literature

Maintenance was not assessed in 43% of previous self-monitoring studies with people with developmental disabilities (i.e., Ganz & Sigafoos, 2005; Hughes & Boyle, 1991; Mace et al., 1986; Morrison et al., 2001; O'Reilly et al., 2002; Strain et al., 1994;). The results of this study contribute to the self-monitoring literature since maintenance was assessed for all student participants. Results of this study indicate that students maintain skills through the use of self-monitoring interventions. The multiple probe design with a reversal for 2 of the 4 participants used in this study infers that the changes in student behavior were due to the self-monitoring intervention and not general improvement in behavior with time.

To what Extent do Teachers Generalize the Self-Monitoring Skills Taught Via the Self-Monitoring Treatment Package?

One teacher (i.e., Lizette) independently generalized the use of the self-monitoring intervention to another activity and implemented it with fidelity. Another teacher (i.e., Beatriz) requested the researcher's assistance to implement the self-monitoring intervention in the generalization activity. During the intervention and maintenance phases of this study and before requesting assistance from the researcher to

utilize the self-monitoring system in another classroom activity, Beatriz reported that she tried to use the system during other activities with Isaac but that it had not worked as well as it did during Circle Time. After receiving feedback from the researcher one day in the generalization activity, Beatriz implemented the intervention with fidelity.

Beatriz also generalized the use of the self-monitoring intervention to another behavior, sitting appropriately on the floor. She required researcher feedback to modify the intervention for the student to implement the self-monitoring system with fidelity on the first day. After that, she independently implemented the system with fidelity.

In addition, Beatriz generalized the use of the self-monitoring intervention to another student and requested the researcher's help. The researcher assisted Beatriz in developing a self-monitoring system for the other student. However, Beatriz did not provide the student with self-monitoring training and instead asker her supporting teacher to assist the student in using the intervention during Circle Time. Beatriz spoke to the researcher about several difficulties with the system and the researcher offered suggestions, including having a self-monitoring training session. However, Beatriz never had the self-monitoring training session, and the intervention was abandoned after a couple of weeks. Anna and Dani did not independently generalize or request researcher assistance to generalize the use of the self-monitoring intervention to another activity, student, or target behavior.

Contribution to Current Literature

Most previous studies (e.g., Agran et al., 2005; Ganz & Sigafoos, 2005; O'Reilly et al., 2002) on self-monitoring have not assessed teachers' ability to generalize self-

monitoring interventions, and none of the four previous studies that used typical intervention (e.g., Gilberts et al., 2001) agents assessed generalization. This study contributes to the self-monitoring literature since teachers' ability to generalize self-monitoring interventions across activities, behaviors, and students was assessed for 2 of 4 teacher participants. One teacher independently generalized the use of the self-monitoring intervention across activities and another generalized the use of the self-monitoring intervention across activities, behaviors, and participants with researcher feedback.

To what Extent do Students Generalize the Skills Targeted in Self-Monitoring Interventions Developed and Implemented by Their Teachers?

Two of the 4 students who participated in this study were provided with the self-monitoring materials during another classroom activity. Their rate of inappropriate sitting decreased immediately with the introduction of the self-monitoring intervention. The PND values during the generalization activity were in the highly effective range.

During the intervention phase in the generalization activity, one student (i.e., Isaac) engaged in self-monitoring behavior an average of 85.4% of the time. This rate was not 100% since during the training teachers were told to prompt students during the first few sessions and then allow the students to independently self-monitor. During the maintenance phase, Isaac's engagement in self-monitoring behavior increased to rates similar to those seen in Circle Time.

When the self-monitoring intervention was introduced in the generalization activity for John, he engaged in self-monitoring behavior almost every time, but required prompting to correctly self-monitor almost half of the time. One factor that might have

influences his independent self-monitoring is that he had not had as much practice utilizing the self-monitoring system in the training activity as had Isaac. Another factor may be that he only used the self-monitoring system for 4 days during Reading before he left the school.

Isaac generalized the use of the self-monitoring system to another target behavior. Initially, when Beatriz generalized the use of it at Isaac's request to sit on the floor but did not receive feedback from the researcher, Isaac's rate of inappropriate sitting on the floor was high and engagement in self-monitoring behavior and independent self-monitoring were low. No baseline data were taken on sitting on the floor, but the rate of inappropriate sitting on the floor when Beatriz did not receive feedback from the researcher was similar to that seen during baseline for Isaac sitting in his chair. The researcher assisted the teacher in operationally defining sitting on the floor. Coming up with an operational definition allowed the teacher to have clear expectations for Isaac but also for herself and her supporting teacher for supporting Isaac. Once it was clear to the teacher and Isaac what constituted appropriate sitting on the floor, Isaac engaged in self-monitoring behavior and self-monitored independently most of the time.

Isaac also generalized the use of the self-monitoring intervention to another target behavior, following directions, after observing his teachers train another student to self-monitor following directions. A new self-monitoring sheet was made to give him space to self-monitor both inappropriate sitting and following directions. Isaac independently utilized the new self-monitoring sheet and his rate of inappropriate sitting remained low.

Later, Isaac even created his own self-monitoring sheets on the back of the sheet the teacher provided, he utilized it, and his rate of inappropriate sitting remained low.

Results of this study suggest that students can generalize the use of self-monitoring interventions. A mediator of generalization is "A stimulus that is maintained and transported by the client as part of treatment" (Stokes and Osnes, 1989, p. 349). The self-monitoring materials for Isaac and John may have functioned as a mediator of generalization.

Contribution to Current Literature

Generalization was not assessed in 79% of previous self-monitoring studies (e.g., Agran et al., 2005; Coyle & Cole, 2004; Newman et al., 2000). This study contributes the self-monitoring literature since generalization was assessed in 2 of the 4 student participants. Results of this study suggest that students can generalize the use of self-monitoring interventions to situations that are similar to the training context without any modifications to the self-monitoring system. Students can also generalize the use of the self-monitoring interventions to situations that are different from the training context if modifications are made to adapt the system for the new context.

According to Teachers, How Valuable are Self-Monitoring Interventions for Young Students with Developmental Disabilities?

One teacher (i.e., Lizette) independently generalized the use of the self-monitoring intervention to another activity and another teacher (i.e., Beatriz) requested the researcher's assistance to implement the self-monitoring intervention in the generalization activity, attempted to utilize a self-monitoring intervention with another

student, and generalized the use of the self-monitoring system to another target behavior. This shows that these two teachers valued the self-monitoring intervention since they independently utilized it in another activity, requested help to utilize it during another activity, utilized it with another student, and generalize it's use to another target behavior.

At the end of the study when teachers were asked to rate the statement, "I believe that the student has benefited from the self-monitoring intervention", 3 of 4 teachers said they agreed with the statement and one teacher stated she somewhat agreed with the statement. When compared to what they reported before the start of the study, 3 of 4 teachers reported an increase in the number of students they believed would benefit from a self-monitoring intervention after the end of the study. Taken together, the various measures of social validity indicate that teachers believed that self-monitoring interventions are valuable for young students with developmental disabilities.

Comments on the Social Importance of the Target Behaviors

It is important to note that although the target behavior for this study was termed appropriate sitting, the operational definition required the students to engage in several types of appropriate classroom behavior. For example, Isaac needed to raise his hand and wait to be called on before getting up to do something he wanted to do, such as fix the numbers on the calendar or go to the bathroom. At the beginning of the school year, Isaac, like his classmates, was learning to raise his hand and ask a question or request permission for something. Isaac benefited from having written sentence strips to prompt his use of vocal language. However, even the presence of written cues was not always enough to prompt him to be calm in requesting his wants and needs. It was anecdotally

noted that at first, Isaac would request what he wanted as he was doing it (e.g., he would say "bathroom" as he was walking away from the activity and going to the bathroom). He later learned to stay in his chair while asking and waiting to act on his request until his teacher gave him permission. On several occasions, Beatriz and Beatriz's supporting teacher commented to the researcher that they had observed Isaac as he was about to stand to do something out of his chair without asking for permission, but he would stop, stay in his chair, glance at his self-monitoring clipboard, and request what he wanted before standing up.

Appropriate sitting also required Isaac to refrain from stomping his feet even when he became frustrated due to not being able to do something he wanted to do or not having things done his way. During intervention and maintenance, it was anecdotally observed that Isaac would look at his self-monitoring materials, look at his feet as he stomped them, look back at his self-monitoring materials and self-monitor independently.

For Davis, sitting appropriately required him not to stand up and engage in stereotypic behavior such as spinning in circles. If Davis was not engaging in stereotypic behavior, he was able to play appropriately with toys. Decreasing Davis' rate of inappropriate sitting meant that the intervention also increased appropriate playing with toys and decreased stereotypic behavior.

At the beginning of the study, John would rock his chair, sit with one leg hanging from one side of his wooden chair, and climb under the table. He would also pretend play with classroom materials. Decreasing inappropriate sitting for John increased his

interacting appropriately with class material and decreased playing with his chair, hands, and class materials.

When Madison was not sitting appropriately, she was not playing with toys or reading books. Madison would also at times suddenly stand up and begin to wander around in the classroom. Thus, increasing sitting appropriately for Madison also meant an increase in playing with toys and reading books and that Madison was not wandering around the classroom.

Contribution to Current Literature

Fifty seven percent of studies on self-monitoring for people with developmental disabilities did not assess the social validity of self-monitoring interventions (e.g., Coyle & Cole, 2004; Ganz & Sigafoos, 2005; Mace et al., 1986; Martella et al., 1993; Morrison et al., 2001), and none assessed the social validity of self-monitoring interventions for children under age 9 (i.e., Newman et al., 2000; Shearer et al.1996; Strain et al., 1994). This study further contributes to the self-monitoring literature by assessing the social validity of self-monitoring interventions in young children (i.e., five year olds) with developmental disabilities. The social validity measures in this study indicate that teachers believed that self-monitoring are effective interventions that can be used in the classroom for young children with developmental disabilities.

Limitations of the Study

The results of this study appear to be of value for training teachers to develop and implement new interventions to increase appropriate classroom behavior and decrease inappropriate classroom behavior, but the results of this study should be interpreted with

caution due to several limitations. First, although data were collected on whether or not the researcher provided feedback to the teacher during self-monitoring implementation sessions, an independent observer did not collect data on the supervision provided to the teachers.

A second limitation was the length of the maintenance phase for 2 of the 4 participants. Maintenance data were taken over a 3-month period or longer for 2 of the 4 participants. However, for the other two participants, maintenance data were taken over a 2- to 3-week period. As such, determinations about these two participants' ability to maintain skills over a longer time span cannot be made.

A third limitation of this study was that generalization was not assessed for all participants. Two of the 4 teacher participants independently generalized or requested the researcher's assistance in generalizing the self-monitoring intervention. The researcher planned on offering additional training to the other two teacher participants after there was a stable pattern of responding for Teacher 4. However, this did not occur until one week before the end of the school year. Thus, the other two teacher participants' ability to generalize the self-monitoring intervention or amount of support required to generalize the self-monitoring intervention are unknown.

Future Research

Future research might replicate the self-monitoring intervention package in other settings (e.g., public school classrooms, homes), to student participants of various ages (i.e., preteens, teenagers, and adults with developmental disabilities), and with other typical intervention agents (e.g., parents). Most of the teacher participants in this study

were Caucasian. Future research might evaluate the efficacy and acceptability of the self-monitoring intervention package with typical intervention agents of various ethnicities. Similarly, all of the student participants in this study were Caucasian. Future research might also evaluate the efficacy of the self-monitoring intervention package with student participants of various ethnicities.

Future research might also further evaluate the maintenance and sustainability of the self-monitoring intervention package. The amount of training and feedback that was provided in this study although not substantial could be further reduced if presented to groups of teachers. Studies that examine the efficacy of this self-monitoring training package (i.e., self-monitoring training and feedback) if delivered in a group setting (e.g., class, workshop) should be conducted.

Future research might also investigate the minimum amount of time that the researcher has to be present during the self-monitoring student training to provide feedback to the teachers. Anecdotally, the researcher provided feedback to teachers initially. But, once the self-monitoring intervention was finalized for the student and the student was responding to the system, the teacher no longer had questions or required researcher feedback.

In this study, when Isaac was already independently self-monitoring, he generalized the use of the self-monitoring system across behaviors after observing his teacher teach another student to self-monitor. Future research should evaluate the effects of training one student to self-monitor on other students. Specifically, future research might determine if other students in the classroom who have developmental disabilities

are able to self-monitor the same behavior simply by observing the teacher train another student to self-monitor.

Summary

In summary, this study examined the effects of a self-monitoring treatment package on both teacher and student behavior in the classroom. Teachers received brief self-monitoring training and were asked to develop a self-monitoring intervention for one of their students to use during a specific classroom activity using a rubric provided during the self-monitoring training. Teachers received feedback from the researcher about the self-monitoring intervention they created. In addition, the researcher was present at most student self-monitoring training sessions to provide feedback and answer questions. The teachers then implemented the self-monitoring system in the classroom, and the researcher provided immediate feedback to teachers if they did not implement the self-monitoring intervention with fidelity. Teachers required very little to no feedback to implement the self-monitoring interventions with fidelity. Rate of inappropriate sitting decreased for all students after the self-monitoring intervention was introduced. The PND values indicated that the self-monitoring interventions were highly effective for 3 participants and effective for 1 participant. One student was able to maintain similar low rates of inappropriate sitting when the target behavior was generalized. One teacher independently generalized the use of the self-monitoring intervention to another activity, and another teacher requested the researcher's assistance to implement the self-monitoring intervention in the generalization activity. Students' rate of inappropriate sitting also decreased when the teacher introduced the self-monitoring intervention in the

generalization activity. The PND values in the generalization activity indicated that the self-monitoring interventions were highly effective. The various measures used to measure social validity indicate that self-monitoring interventions for young children with developmental disabilities are socially important.

APPENDIX A

Form for Identifying Student Participants

Student's Name: _____
Date: _____
Teacher's Name: _____

Directions: Record the teacher's answer to the first two questions with a "yes" or "no". Have the teacher answer Question 3 using the 5-point Likert scale, and record his/her answer by circling the corresponding number. If the teacher answers yes to Question 1, no to Question 2, and indicates 4 or 5 on Question 3b, the participant is a candidate for this study.

1. It is an educational priority for this student to increase their appropriate classroom behavior. _____

2. Are you currently using a self-monitoring system with this student? _____

3a. If the teacher answered "yes" to #2: Please answer the following statement using the 5-point Likert scale,

"I believe that the student is benefiting from the self-monitoring intervention."

1	2	3	4	5
Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Agree

3b. If the teacher answered "no" to #2: Please answer the following statement using the 5-point Likert scale.

"I believe that the student would benefit from the self-monitoring intervention."

1	2	3	4	5
Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Agree

Notes. _____
_____
_____
_____
_____

APPENDIX B

Teacher Baseline Data Sheet for Isaac

Data taken by _____

Date: _____

Activity: _____

Beginning Time: _____

Ending Time: _____

Materials: This data sheet, pencil, and watch.

Operational Definition of **Appropriately Sitting in Chair**: Isaac sits in his chair with his bottom touching the seat of the chair, all legs of chair completely touching the floor, both feet flat on the floor with no more than two continuous strums of feet on the floor (e.g., no stomping), and keeping his body to himself (e.g., not touching or leaning on other people).
Note. If teacher has given him permission to be out of his chair, do not count as inappropriate sitting.

Directions: Begin by recording the date at the top of the data sheet. Next, circle the phase of the intervention. Note the beginning and ending time of the activity.
Use a clicker to note every time Isaac is not sitting in his chair. Record the number of times that Isaac is out of his chair below.
OR
Use the space below to note with a tally every time Isaac is NOT sitting appropriately in his chair.

Note the number of times that Isaac is out of his chair below and calculate a rate.
# of times NOT sitting appropriately in chair: _____

Rate: (# of times out of chair)/(length of the activity in minutes) = _____

APPENDIX C

Baseline Data Sheet for Davis

Data Collector: _____ Primary Data Interobserver agreement Data

Date: _____

Activity: _____

Start Time: _____ End Time: _____
TOTAL Time: _____

Materials: This data sheet, pencil, and watch.

Operational Definitions. **Sitting in Chair**: Davis sits in his chair with his bottom touching the seat of the chair and both feet flat on the floor.
Prompts to sit appropriately: Any single or series of vocal (e.g., "you need to check your timer") or non-vocal (e.g., pointing to the self-monitoring material) reminders, with less than a 3-s pause between reminders, for the student to sit appropriately.

Directions: Begin by recording the date at the top of the data sheet. Next, circle the phase of the intervention. Note the beginning and ending time of the activity.
Use the table below to note below whether Davis sat in his chair during the entire interval each minute. Use Y for Yes and N for N. Also record the number of prompts given by teacher to sit.

TIME	WAS DAVIS SITTING THE ENTIRE INTERVAL?	NUMBER OF PROMPTS TO SIT
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

14		
15		
TOTAL		

Note the number of times that Davis is out of her chair below and calculate a rate.

# of times out of chair: _____

Rate: (# of times out of chair)/(length of the activity in minutes) = _____

# of prompts to sit appropriately: _____

Rate: (# of prompts to sit)/(length of the activity in minutes) = _____

SOCIAL VALIDITY:

Number of interval that the best-behaved student, _____, is out of his chair.

Rate: (# of intervals out of chair)/(length of the activity in minutes) = _____

Children Absent: _____

Other Notes; _____

_____

_____

_____

_____

_____

APPENDIX D

Baseline Data Sheet for John

Data Collector: _____ Primary Data Interobserver agreement Data

Date: _____

Beginning Time: _____

Ending Time: _____

Operational Definitions. **Appropriate Sitting**: John sits in his chair with his bottom touching the seat of the chair

Note 1. The following exceptions should not be counted as inappropriate sitting: 1)If teacher has given him permission to be out of his chair. 2) If John gets up or reaches to get necessary class material or participate in class.

Note 2. If John is playing with class material, count as inappropriate sitting.

Prompts to sit appropriately: Any single or series of vocal (e.g., "you need to check your timer") or non-vocal (e.g., pointing to txhe self-monitoring material) reminders, with less than a 3-s pause between reminders, for the student to sit appropriately.

Directions: Begin by recording the date at the top of the data sheet. Note the beginning and ending time of the activity. Use "Y" or a check mark for yes and "N" or "X" for no to fill out the table below. Under Reinforcement, note if Reinforcement was delivered, who delivered it, and what it was. Also record the number of prompts given by teacher to sit.

TIME	SITTING THE ENTIRE INTERVAL?	Did John self-monitor?	Did John self-monitor independently?	Reinforcement	Prompts to sit appropriately
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

13					
14					
15					
16					
17					
18					
19					
20					

Note the number of times that John is out of her chair below and calculate a rate.

# of times out of chair: _____

Rate: (# of times out of chair)/(length of the activity in minutes) = _____

# of prompts to sit appropriately: _____

Rate: (# of prompts to sit)/(length of the activity in minutes) = _____

SOCIAL VALIDITY:

Number of interval that the best-behaved student, _____, is out of his chair.

Rate: (# of intervals out of chair)/(length of the activity in minutes) = _____

Children Absent: _____

Other Notes; _____

_____

_____

_____

_____

_____

APPENDIX E

Teacher Baseline Data Sheet for Madison

Date: _____

Activity: _____

Beginning Time: _____

Ending Time: _____

Materials: This data sheet, pencil, and watch.

Operational Definitions. **Sitting in Chair**: Madison sits in her chair with her bottom touching the seat of the chair and both feet flat on the floor.
Prompts to sit appropriately: Any single or series of vocal (e.g., "you need to check your timer") or non-vocal (e.g., pointing to the self-monitoring material) reminders, with less than a 3-s pause between reminders, for the student to sit appropriately.

Directions: Begin by recording the date at the top of the data sheet. Next, circle the phase of the intervention. Note the beginning and ending time of the activity.
Use a clicker to note every time Madison is not sitting in her chair. Record the number of times that Madison is out of her chair below.
OR
Use the space below to note with a tally mark every time Madison is out of her chair and every time she is prompted to sit appropriately.

NOT sitting appropriately	Prompts to sit appropriately

Note the number of times that Madison is out of her chair below and calculate a rate.

# of times out of chair: _____

Rate: (# of times out of chair)/(length of the activity in minutes) =
_____

# of prompts to sit appropriately: _____

Rate: (# of prompts to sit)/(length of the activity in minutes) = _____

APPENDIX F

Teacher Intervention and Maintenance Data Sheet for Isaac

Date: _____ Activity: _____

Beginning Time: _____

Ending Time: _____

Phase of Intervention: Intervention Maintenance

Operational Definition of **Appropriately Sitting in Chair**: Isaac sits in his chair with his bottom touching the seat of the chair, all legs of chair completely touching the floor, both feet flat on the floor with no more than two continuous strums of feet on the floor (e.g., no stomping), and keeping his body to himself (e.g., not touching or leaning on other people).
Note. If teacher has given him permission to be out of his chair, do not count as inappropriate sitting.

Directions: Use the chart below to note every time that Isaac is NOT appropriately sitting in his chair. Use "Y" or a check mark for yes and "N" or "X" for no to fill out the table below.

NOT Sitting appropriately in chair	Was Isaac **sitting appropriate**?	Did Isaac **self-monitor**?	Did Isaac self-monitor **independently**?
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

APPENDIX G

Teacher Intervention Data Sheet for Davis

Date: _____

Activity: _____

Start Time: _____ End Time: _____
TOTAL Time: _____

Phase of Intervention: Intervention

Materials: This data sheet, pencil, and watch.

Operational Definitions. **Sitting in Chair**: Davis sits in his chair with his bottom touching the seat of the chair and both feet flat on the floor.
Prompts to sit appropriately: Any single or series of vocal (e.g., "you need to check your timer") or non-vocal (e.g., pointing to the self-monitoring material) reminders, with less than a 3-s pause between reminders, for the student to sit appropriately.

Directions: Begin by recording the date at the top of the data sheet. Next, circle the phase of the intervention. Note the beginning and ending time of the activity. Use "Y" or a check mark for yes and "N" or "X" for no to fill out the table below.

TIME	SITTING THE ENTIRE INTERVAL?	Did Davis self-monitor?	Did Davis self-monitor independently?	Did Davis receive reinforcement?
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

15				
TOTAL				

Note the number of times that Davis is out of his chair below and calculate a rate.

# of times NOT sitting appropriately in chair: _____
Rate: (# of times out of chair)/(length of the activity in minutes) = _____

Total number of teacher reminders: _____

RATE: _____/_____=_____ per minute
(Total number of teacher reminders/length of the activity)

Directions. Use a stopwatch to calculate the total time that the self-monitoring material was made available to the student during the activity. Start the stopwatch when the self-monitoring material is made available to the student during the specific class period. Stop the time when the material is no longer available for the student or the class period has ended.

Total time that self-monitoring material is made available to the target student: _____

APPENDIX H

Intervention Data Sheet for John

Data Collector: _____ Primary Data Interobserver agreement Data

Date: _____

Beginning Time: _____

Ending Time: _____

Phase of Intervention: Baseline Intervention Maintenance

Operational Definition of **Appropriate Sitting**: John sits in his chair with his bottom touching the seat of the chair

Note 1. The following exceptions should not be counted as inappropriate sitting: 1)If teacher has given him permission to be out of his chair. 2) If John gets up or reaches to get necessary class material or participate in class.

Note 2. If John is playing with class material, count as inappropriate sitting.

Directions: Begin by recording the date at the top of the data sheet. Next, circle the phase of the intervention. Note the beginning and ending time of the activity. Use "Y" or a check mark for yes and "N" or "X" for no to fill out the table below. Under Reinforcement, note if Reinforcement was delivered, who delivered it, and what it was. Also record the number of prompts given by teacher to sit.

TIME	SITTING THE ENTIRE INTERVAL?	Did John self-monitor?	Did John self-monitor independently?	Reinforcement	NUMBER OF TEACHER PROMPTS TO SIT
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					

14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
TOTAL					

Rate: (# of times out of chair)/(length of the activity in minutes) = _____

Directions. Use a stopwatch to calculate the total time that the self-monitoring material was made available to the student during the activity. Start the stopwatch when the self-monitoring material is made available to the student during the specific class period. Stop the time when the material is no longer available for the student or the class period has ended.

Total time that self-monitoring material is made available to the target student: _____

SOCIAL VALIDITY:

Number of intervals that the best-behaved student, _____, is out of his/her chair.

Rate: (# of intervals out of chair)/(length of the activity in minutes) = _____

TREATMENT FIDELITY

1. Did the teacher provide the student with the self-monitoring materials? Y N

2. Did the student require prompting to use the self-monitoring system? Y N

3. If yes on #2, did the teacher provide prompting? Y N

4. Did the teacher make reinforcement available to the student? Y N

5. Was the reinforcement contingent on the target behavior? Y N

Children Absent: _____

Other Notes; _____

_____

_____

_____

APPENDIX I

Teacher Intervention Data Sheet for Madison

Date: _____

Activity: _____

Beginning Time: _____

Ending Time: _____

Materials: This data sheet, pencil, and watch.

Operational Definitions. **Sitting in Chair**: Madison sits in her chair with her bottom touching the seat of the chair and both feet flat on the floor.
Prompts to sit appropriately: Any single or series of vocal (e.g., "you need to check your timer") or non-vocal (e.g., pointing to the self-monitoring material) reminders, with less than a 3-s pause between reminders, for the student to sit appropriately.

Directions: Use the chart below to note every time that Madison is NOT appropriately sitting in his chair. Use "Y" or a check mark for yes and "N" or "X" for no to fill out the table below.

NOT Sitting appropriately in chair	Was Madison **sitting appropriate**?	Did Madison **self-monitor**?	Did Madison self-monitor **independently**?	Did Madison self-monitor **correctly**?	Number of prompts to sit appropriately
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Note the number of times that Madison is out of his chair below and calculate a rate.

# of times NOT sitting appropriately in chair: _____

Rate: (# of times out of chair)/(length of the activity in minutes) = _____

Total number of teacher reminders: _____

RATE: _____/_____=_____ per minute
(Total number of teacher reminders/length of the activity)

Directions. Use a stopwatch to calculate the total time that the self-monitoring material was made available to the student during the activity. Start the stopwatch when the self-monitoring material is made available to the student during the specific class period. Stop the time when the material is no longer available for the student or the class period has ended.

Total time that self-monitoring material is made available to the target student: _____

Other Notes; _____

_____

_____

_____

_____

APPENDIX J

Interobserver Agreement Baseline Data Sheet for Isaac

Interobserver agreement Data Taken By: _____

Date: _____

Activity: _____

Beginning Time: _____

Ending Time: _____

Materials: This data sheet, pencil, and watch.

Operational Definitions. **Appropriately Sitting in Chair**: Isaac sits in his chair with his bottom touching the seat of the chair, all legs of chair completely touching the floor, both feet flat on the floor with no more than two continuous strums of feet on the floor (e.g., no stomping), and keeping his body to himself (e.g., not touching or leaning on other people).
Note. If teacher has given him permission to be out of his chair, do not count as inappropriate sitting.
Prompts to sit appropriately: Any single or series of vocal (e.g., "you need to check your timer") or non-vocal (e.g., pointing to the self-monitoring material) reminders, with less than a 3-s pause between reminders, for the student to sit appropriately.

Directions: Begin by recording the date at the top of the data sheet. Next, circle the phase of the intervention. Note the beginning and ending time of the activity.
Use the space below to note with a tally mark every time Madison is out of her chair and every time she is prompted to sit appropriately.

NOT sitting appropriately	Prompts to sit appropriately

Note the number of times that Madison is out of her chair below and calculate a rate.

# of times out of chair: _____

Rate: (# of times out of chair)/(length of the activity in minutes) = _____

# of prompts to sit appropriately: _____

SOCIAL VALIDITY:

Number of times that the best-behaved student, _____, is out of his chair.

# of times out of chair: _____

Rate: (# of times out of chair)/(length of the activity in minutes) = _____

Children Absent: _____

Other Notes; _____

_____

_____

_____

_____

_____

APPENDIX K

Interobserver Agreement Intervention and Maintenance Data Sheet for Isaac

Interobserver agreement Data Taken By: _____

Date: _____ Activity: _____

Beginning Time: _____

Ending Time: _____

Phase of Intervention: Intervention Maintenance

Operational Definitions. **Appropriately Sitting in Chair**: Isaac sits in his chair with his bottom touching the seat of the chair, all legs of chair completely touching the floor, both feet flat on the floor with no more than two continuous strums of feet on the floor (e.g., no stomping), and keeping his body to himself (e.g., not touching or leaning on other people). Note. If teacher has given him permission to be out of his chair, do not count as inappropriate sitting.
Prompts to sit appropriately: Any single or series of vocal (e.g., "you need to check your timer") or non-vocal (e.g., pointing to the self-monitoring material) reminders, with less than a 3-s pause between reminders, for the student to sit appropriately.

Directions: Use the chart below to note every time that Isaac is NOT appropriately sitting in his chair. Use "Y" or a check mark for yes and "N" or "X" for no to fill out the table below.

NOT Sitting appropriately in chair	Was Isaac **sitting appropriate**?	Did Isaac **self-monitor**?	Did Isaac self-monitor **independently**?	Number of prompts to sit appropriately
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

13				
14				
15				
16				
17				
18				
19				
20				

Note the number of times that Isaac is out of his chair below and calculate a rate.

# of times NOT sitting appropriately in chair: _____

Rate: (# of times out of chair)/(length of the activity in minutes) = _____

Total number of teacher reminders: _____

RATE: _____/_____=_____ per minute

(Total number of teacher reminders/length of the activity)

Directions. Use a stopwatch to calculate the total time that the self-monitoring material was made available to the student during the activity. Start the stopwatch when the self-monitoring material is made available to the student during the specific class period. Stop the time when the material is no longer available for the student or the class period has ended.

Total time that self-monitoring material was made available to the student: _____

SOCIAL VALIDITY:

Number of times that the best-behaved student, _____, is out of his chair.

# of times out of chair: _____

Rate: (# of times out of chair)/(length of the activity in minutes) = _____

Children Absent: _____

Other Notes; _____

_____

APPENDIX L

Interobserver Agreement Baseline Data Sheet for Madison

Interobserver agreement Data Taken By: _____

Date: _____

Activity: _____

Beginning Time: _____

Ending Time: _____

Materials: This data sheet, pencil, and watch.

Operational Definitions. **Sitting in Chair**: Madison sits in her chair with her bottom touching the seat of the chair and both feet flat on the floor.
Prompts to sit appropriately: Any single or series of vocal (e.g., "you need to check your timer") or non-vocal (e.g., pointing to the self-monitoring material) reminders, with less than a 3-s pause between reminders, for the student to sit appropriately.

Directions: Begin by recording the date at the top of the data sheet. Next, circle the phase of the intervention. Note the beginning and ending time of the activity.
Use the space below to note with a tally mark every time Madison is out of her chair and every time she is prompted to sit appropriately.

NOT sitting appropriately	Prompts to sit appropriately

Note the number of times that Madison is out of her chair below and calculate a rate.

# of times out of chair: _____

Rate: (# of times out of chair)/(length of the activity in minutes) =
_____

# of prompts to sit appropriately: _____

Rate: (# of prompts to sit)/(length of the activity in minutes) = _____

SOCIAL VALIDITY:

Number of times that the best-behaved student, _____, is out of his chair.

# of times out of chair: _____

Rate: (# of times out of chair)/(length of the activity in minutes) = _____

Children Absent: _____

Other Notes; _____

_____

_____

_____

_____

_____

APPENDIX M

Interobserver Agreement Intervention Data Sheet for Davis

Interobserver agreement Data Taken By: _____

Date: _____

Start Time: _____ End Time: _____
TOTAL Time: _____

Phase of Intervention: Intervention

Materials: This data sheet, pencil, and watch.

Operational Definitions. **Sitting in Chair**: Davis sits in his chair with his bottom touching the seat of the chair and both feet flat on the floor.
Prompts to sit appropriately: Any single or series of vocal (e.g., "you need to check your timer") or non-vocal (e.g., pointing to the self-monitoring material) reminders, with less than a 3-s pause between reminders, for the student to sit appropriately.

Directions: Begin by recording the date at the top of the data sheet. Next, circle the phase of the intervention. Note the beginning and ending time of the activity. Use "Y" or a check mark for yes and "N" or "X" for no to fill out the table below. Under Reinforcement, note if Reinforcement was delivered, who delivered it, and what it was. Also record the number of prompts given by teacher to sit.

TIME	SITTING THE ENTIRE INTERVAL?	Did Davis self-monitor?	Did Davis self-monitor independently?	Reinforcement	NUMBER OF PROMPTS TO SIT
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

13					
14					
15					
TOTAL					

Rate: (# of times out of chair)/(length of the activity in minutes) = _____

Total number of teacher reminders: _____

RATE: _____/_____=_____ per minute
(Total number of teacher reminders/length of the activity)

Directions. Use a stopwatch to calculate the total time that the self-monitoring material was made available to the student during the activity. Start the stopwatch when the self-monitoring material is made available to the student during the specific class period. Stop the time when the material is no longer available for the student or the class period has ended.

Total time that self-monitoring material is made available to the target student: _____

SOCIAL VALIDITY:

Number of intervals that the best-behaved student, _____, is out of his/her chair.

Rate: (# of intervals out of chair)/(length of the activity in minutes) = _____

TREATMENT FIDELITY

1. Did the teacher provide the student with the self-monitoring materials? Y N

2. Did the student require prompting to use the self-monitoring system? Y N

3. If yes on #2, did the teacher provide prompting? Y N

4. Did the teacher make reinforcement available to the student? Y N

5. Was the reinforcement contingent on the target behavior? Y N

Children Absent: _____

APPENDIX N

Interobserver agreement Intervention Data Sheet for Madison

Interobserver agreement Data Taken By: _____

Date: _____

Activity: _____

Beginning Time: _____

Ending Time: _____

Materials: This data sheet, pencil, and watch.

Operational Definitions. **Sitting in Chair**: Madison sits in her chair with her bottom touching the seat of the chair and both feet flat on the floor.
Prompts to sit appropriately: Any single or series of vocal (e.g., "you need to check your timer") or non-vocal (e.g., pointing to the self-monitoring material) reminders, with less than a 3-s pause between reminders, for the student to sit appropriately.

Directions: Use the chart below to note every time that Madison is NOT appropriately sitting in his chair. Use "Y" or a check mark for yes and "N" or "X" for no to fill out the table below.

NOT Sitting appropriately in chair	Was Madison **sitting appropriate**?	Did Madison **self-monitor**?	Did Madison self-monitor **independently** ?	Did Madison self-monitor **correctly**?	Number of prompts to sit appropriately
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Note the number of times that Madison is out of his chair below and calculate a rate.
# of times NOT sitting appropriately in chair: _____

Rate: (# of prompts to sit)/(length of the activity in minutes) = _____

# of prompts to sit appropriately: _____
Rate: (# of prompts to sit)/(length of the activity in minutes) = _____

Directions. Use a stopwatch to calculate the total time that the self-monitoring material was made available to the student during the activity. Start the stopwatch when the self-monitoring material is made available to the student during the specific class period. Stop the time when the material is no longer available for the student or the class period has ended.

Total time that self-monitoring material is made available to the target student: _____

SOCIAL VALIDITY:

Number of times that the best-behaved student, _____, is out of his chair.

# of times out of chair: _____

Rate: (# of times out of chair)/(length of the activity in minutes) = _____

TREATMENT FIDELITY

1. Did the teacher provide the student with the self-monitoring materials? Y N

2. Did the student require prompting to use the self-monitoring system? Y N

3. If yes on #2, did the teacher provide prompting? Y N

4. Did the teacher make reinforcement available to the student? Y N

5. Was the reinforcement contingent on the target behavior? Y N

Children Absent: _____

Other Notes; _____

_____

APPENDIX O

Interobserver Agreement Treatment Fidelity Data Sheet

Teacher : _____ Student: _____

Interobserver Agreement Data Collector: _____

Date: _____ Class Activity: _____

Beginning Time: _____ Ending Time: _____

Phase: Intervention Maintenance

Materials. Pen, this data sheet.

Directions. 1. Begin by filling out the teacher's name, student's name, your name under primary data collector's name OR agreement data collector, date, class activity, time that the activity began, and circle baseline, intervention, or maintenance.
2. Observe the interaction between the classroom teacher and the target student. Circle Y for yes and N for no for each of the questions below.
3. When the activity has finished, note the end time of the activity in the corresponding space above.

1. Did the teacher provide the student with the self-monitoring materials? Y N

2. Did the student require prompting to use the self-monitoring system? Y N

3. If yes on #2, did the teacher provide prompting? Y N

4. Did the teacher make reinforcement available to the student? Y N

5. Was the reinforcement contingent on the target behavior? Y N

APPENDIX P

Self-Monitoring Training Handout
Page 1/6

A. About Self-Monitoring
1. People learn to discriminate between occurrences and non-occurrences of specific target behavior and recording accordingly (Nelson & Hayes, 1981; Newman, Reinecke, & Meinberg, 2000; O'Reilly et al., 2002)
2. Self-monitoring: Self-assessment and self-evaluation
3. Self-monitoring and reinforcement
    a. Most self-monitoring interventions include reinforcement
    b. Reinforcement is not essential
    c. Study showed that self-monitoring without reinforcement was not effective; need further research
    d. Self-reinforcement-a person delivers their own reinforcer
4. The effectiveness of self-monitoring does not depend on the accuracy of self-monitoring.

B. Advantages of Using a Self-Monitoring System
1. Relatively easy to use strategy because once the student learns to self-monitor, little or no adult direction is required (Ganz & Sigafoos, 2005)
2. May promote generalization of target behavior across settings
3. May enhance quality of life by promoting self-determination

C. Self-Monitoring and Students with Developmental Disabilities
1. Self-monitoring has been used to teach students with disabilities the following skills.
    a. Play skills: Imaginary play and drawing
    b. Social skills: Negative statements, requesting, commenting, sharing, interacting with customers, asking more questions during a conversation, and decreasing the number of repetitions in a conversation
    c. Work/academic skills: following directions, work task completion, academic survival skills, units of work produced, on-task behavior

D. How to Create a Self-Monitoring System
1. Selecting a behavior to target
    a. Observable
    b. Target the most important dimension of the behavior
    b. **Define the behavior**; be specific
2. Selecting a time when the self-monitoring intervention will be used
3. Selecting a self-monitoring system
    a. Recording the behavior

i. Cued self-recording-giving students a signal (e.g., tone, watch, timer) to record their behavior
ii. Non-cued self-recording-asking the students to note every time they engage in the behavior

b. Methods to measure student's behavior
i. **Event recording**-recording each instance of the behavior
a. Examples: tally, wrist counters, paper clips, etc.
b. Advantages: Easy to do
c. Considerations:
1. Difficult if the behavior occurs too frequently
2. The behavior must have a clear beginning and end
3. Is not an accurate measure for behavior that occurs for extended periods of time (e.g., being on task, playing alone, listening, etc.)
ii. Time Sampling-divide the observation period into equal intervals and record the behavior at the end of the interval; a timing device to signal the beginning and end of the period is required
a. **Whole-interval recording**-at the end of each interval, record whether the behavior occurred for the entire interval.
1. It can underestimate the occurrence of behavior, especially if large intervals are used for short-duration behaviors.
b. **Partial-interval recording**- at the end of each interval, record whether the behavior occurred at any time during the interval.
1. Good for behavior that has a clear beginning and end and does not last for a very long time.
2. It can overestimate the occurrence of behavior, especially if large intervals are used for short-duration behaviors.
c. **Momentary time sampling**- at the end of each interval, record whether the behavior is occurring.
1. It can overestimate or underestimate a behavior

c. Type of system: Consider the student's fine motor abilities; select material that makes self-monitoring easy for the student; make it simple.

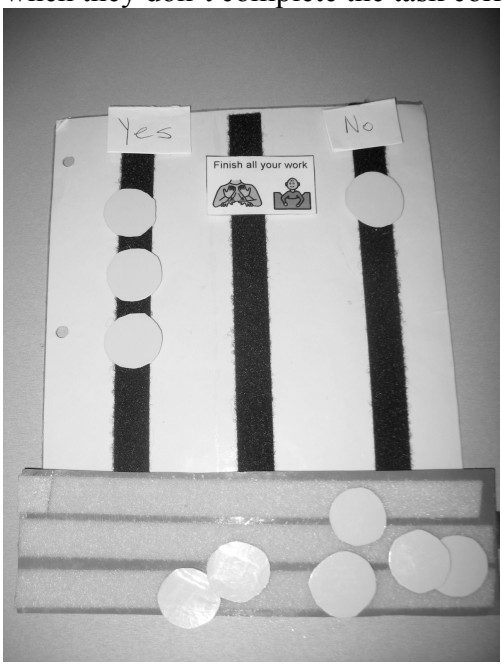
i. **Paper and pencil**

a. The students may be asked to check whether they correctly completed each task (e.g., numbers 1-3 each represent one task). Specific information about each task would be inserted into the worksheet for each student.

	Yes	No
1	☐	☐
2	☐	☐
3	☐	☐

ii. **Three-dimensiona objects** (e.g., blocks, beads, disks, tokens placed in a container, golf counter, or wooden rings placed on a dowel

a. Ex. The student may be asked to put a three-dimensional dot under the yes column when they correctly complete a task or under the no column when they don't complete the task correctly.



d. Delivering the reinforcer. You can:
    i. Deliver the reinforcer to the student
    ii. Have someone else deliver the reinforcer to the student
    iii. Have the student deliver his/her own reinforcer (self-reinforcement)

4. **Reinforcement**
    a. Types of Reinforcers
        i. Primary reinforcement (e.g., M & Ms, Skittles, goldfish, etc)
        ii. Secondary reinforcement
            a. Tangible objects (e.g., books, stickers, and puzzles)
            b. Non-tangible objects (high fives or hugs from a teacher or friend)
    b. Hints on using reinforcers
        i. Use a reinforcement that will not be available during another time of day (the student will be more motivated by it)
        ii. Satiation (if the student receives too much of the reinforcers, the reinforcers will lose its value).
        iii. Use differential reinforcement-if a student correctly monitors his/her own behavior but does not engage in appropriate behavior, reinforce differently than if the student correctly monitors his/her own behavior and engages in appropriate behavior.
    c. Selecting a reinforcer
        i. Something you know the student likes
        ii. Ask for input from others (teachers, paraprofessionals, parents, therapists, etc.)
    d. Deciding how many reinforcers to select
        i. You can have one or more reinforcers
        ii. If you want to differentially reinforce, it is helpful to have two or more reinforcers. Otherwise, differential reinforcement can be done by providing varying amounts of the same reinforcers.
        iii. If you have more than one reinforcer, you can have the student choose what he/she would like to work for that day.
        iv. Advantages of having more than one reinforcer
            a. The student can pick which reinforcer to get that day.
            b. Having more reinforcers may be helpful to ensure that the reinforcer will continue to be highly preferred.

v. Disadvantages of having more than one reinforcer
a. There will be fewer reinforcers available for use during other times of the student's day.
b. The student may have only a few things that are highly preferred.

5. **Set the contingency and set a goal for the student**
   a. How does the student need to behave in order to have access to the reinforcer?
   b. Set realistic goals
   c. Can take the student's current level of performance and require a small change at first
   d. Can start with small goals and build to larger goals
   e. Can also look at how other students in the classroom behave to set a final goal for the student
6. Maintaining desired behavior
   a. Fading self-monitoring systems
      i. Increase the expectation
      ii. Decrease the frequency that the student uses the self-monitoring intervention
      iii. Eliminate the use of tangible self-monitoring material
   b. Ensure that the student is able to maintain his/her behavior when fading the use of a self-monitoring system.
   c. It may not be necessary to fade all self-monitoring systems, depending on the type of system (e.g., many adults use planners and to-do lists)

E. Guidelines on Teaching Students to Use Self-Monitoring Systems
1. Explain to the student the behavior that he/she will be self-monitoring.
2. Provide the student with examples and non-examples of the behavior.
3. Explain the purpose, method, and steps of self-monitoring. Teach the student specifically about the steps of the self-monitoring system that he/she will use.
4. Model self-monitoring and provide examples and non-examples
5. Role-play with the student
   a. Deliver direction while the student practices examples and non-examples of the target behavior
   b. Have the student self-monitor as you role play
   c. Provide the student with verbal praise when h correctly self-monitor and corrective feedback for incorrect steps/responses.
      i. Provide the student with their choice of reinforcement when they correctly self-monitor.

6. Continue training until the student has learned to correctly self-monitor.
    7. Things to remember
        a. Training sessions should be no longer than 15 minutes.
        b. If the student has not learned to self-monitor during one training session, resume the session another day.
    8. Have the student use the self-monitoring system in the classroom.
        a. Initially, for the first couple of sessions at most, you may want to provide the student with feedback regarding their accuracy of self-monitoring.
        c. Then, allow the student an opportunity to self-monitor independently.
        d. Remember that the self-monitoring intervention can still be effective even if the student is not monitoring accurately.
        e. You should expect that the student's accuracy of self-monitoring will improve with time, especially if differential reinforcement is used for correct self-monitoring.
        f. Evaluate whether or not the student's behavior is improving (for this study, I will be discussing this information with you on a daily basis).

APPENDIX Q

Teacher's Responses During Self-Monitoring Training
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Session Number: _____/_____

Teacher's Name: _____ Trainer's Name: _____

Date: _____

Beginning Time: _____ Ending Time: _____

Directions. Please note below the teacher's responses to the following questions. Teachers must be able to provide a correct answer for each item below before moving on to the next item and/or before training is completed and before moving to the next phase.

1. Provide an example of an operational definition

   _____
   _____
   _____
   _____
   _____

2. Provide an example of event recording

   _____
   _____
   _____
   _____
   _____
   _____

3. Provide an example of whole-interval recording

   _____
   _____
   _____
   _____
   _____
   _____

4. Provide an example of partial-interval recording

   _____
   _____
   _____
   _____
   _____
   _____

Teacher's Responses During Self-Monitoring Training
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5. Provide an example of momentary time sampling

6. Provide an example of a paper-and-pencil self-monitoring system

7. Provide an example of a three-dimensional self-monitoring system

8. Provide examples of reinforcers that can be used for a self-monitoring system and state how these reinforcers were selected.

9. State how differential reinforcement can be used with the aforementioned reinforcers.

10. Set an appropriate contingency for the reinforcers mentioned above. Mention who will be delivering the reinforcers.

11. Provide an example of how fading can be used for the target behavior and self-monitoring systems that the teacher previously described.

12. Does the teacher indicate that he/she is confident that the training he/she has received will enable him/her to create a self-monitoring system for a student? (If the answer is no, please note the topics that the teacher is uncertain about. Then, go back and clarify each until the teacher feels confident.)

APPENDIX R

Rubric For Developing a Self-Monitoring Intervention
Page 1/3

Directions. The questions below are intended to help you develop a self-monitoring intervention for one of your students. Please fill out each question below.

Teacher's Name: _____ Student's Name: _____

1. List the target behavior and provide an operational definition of the target behavior.
   _____
   _____
   _____
   _____
   _____
   _____
   _____
2. Provide one example of the target behavior in #1.
   _____
   _____
   _____
   _____
   _____
3. Provide one non-example of the target behavior in #1.
   _____
   _____
   _____
   _____
   _____
   _____
4. Describe the classroom activity when the self-monitoring intervention will be used. _____
   _____
   _____
   _____
   _____
   _____

5. Describe the method of recording the target behavior (e.g., cued or non-cued).

6. Describe the method of data collection (e.g., event recording, whole-interval recording, partial-interval recording, momentary time sampling) for the target behavior in #1; please be specific. _____

7. Describe the type of self-monitoring system (e.g., paper and pencil, three-dimensional) that you would use to measure the aforementioned target behavior.

8. What reinforcement will be used?

9. How was the reinforcement chosen?

10. Will you use differential reinforcement? If so, please describe.

11. What is the contingency? (e.g., when will the student receive reinforcement?). Indicate who will be delivering the reinforcers.

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